

---

Technical Manual

---



---

P/n: RAA022B

---

## 1. Revisions

Table 1: Table of Revisions

Index	P/N revision	Revision	Section	Date
RAA022AA	RAH912AA	≤ V1.01	All	31/03/02
RAA022B	RAH986	XL 80 integration	All	30/04/04

This document applies to the latest higher software version.

When a subsequent software version changes the information in this document, a new issue will be released.

### 1.1. Notice of liability

The information in this manual is distributed on an "as is" basis, without warranty. While every precaution has been taken in the preparation of the manual, **ABX DIAGNOSTICS** shall have any liability to any person or entity with respect to liability, loss, or damage caused or alleged to be caused directly or indirectly by the instructions contained in this manual or by the computer software and hardware products described herein.

### 1.2. Trademarks

Other product names mentioned within this publication may be trademarks or registered trademarks of other companies.

### 1.3. Copyright © 2002 by **ABX DIAGNOSTICS**

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of **ABX DIAGNOSTICS**.

**ABX DIAGNOSTICS**

Parc Euromédecine

Rue du caducée

B.P. 7290

34184 MONTPELLIER Cedex 4 - FRANCE

Tel: (33) (0)4 67 14 15 16

Fax: (33) (0)4 67 14 15 17

## 2. Working conditions

### 2.1. Environment

The Pentra 80 should be operated in an indoor location only. Operation at an altitude over 3000 meters (9800 feet) is not recommended. Instrument is designed to be safe for transient voltages according to INSTALLATION CATEGORY II and POLLUTION DEGREE 2.

Please ask your *ABX Diagnostics* representative service center for any information about the operating location when it does not comply with the recommended specifications.

### 2.2. Location

The Pentra 80 should be placed on a clean and leveled table or work station. Please note that the Pentra 80, printer and reagents weigh approximately 40 kilograms (88 lbs). Avoid exposure to sunlight. Proper ventilation requires that a space of at least 20 cm (8 inches) must be left behind the instrument.

### 2.3. Grounding

Proper grounding is required. Check that the wall ground (earth) plug is correctly connected to the laboratory grounding electricity installation.

If there is no ground then use a ground stake. Current electricity Standards must be applied.

### 2.4. Humidity and temperature conditions

The Pentra 80 must function between 16 to 34°C (61 to 93°F). Maximum relative humidity 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F). If it is kept at a temperature of less than 10°C (50°F), the instrument should be allowed to sit for an hour at the correct room temperature before use.

### 2.5. Electromagnetic environment check

The Pentra 80 has been designed to produce less than the required level of electromagnetic interferences in order to operate in conformity with its destination. The electromagnetic interferences caused by the Pentra 80 are limited to a level allowing the correct operation of other instruments in conformity with their destination.

In case of problems, check that the instrument is not placed in proximity of electromagnetic fields, or short wave emissions (radars, X-rays, scanner, etc...).

### 2.6. Environment protection

Used accessories and consumables must be collected by a laboratory specialized in elimination and recycling of this kind of material according to the legislation.





---

## Specifications

---

1. Technical specifications .....	1-2
1.1. Parameters.....	1-2
1.2. Throughput Analyses .....	1-2
1.3. Tube identification .....	1-2
1.4. Reagents.....	1-3
1.5. Internal Computer .....	1-3
1.6. Measurements and computation.....	1-3
2. Physical specifications.....	1-3
2.1. Power requirements.....	1-3
2.2. Operating temperature and humidity .....	1-3
2.3. Dimension and weight .....	1-3
2.4. Minimum specimen volume .....	1-4
2.5. dilution ratios .....	1-4
2.6. Hgb measurement .....	1-4
2.7. Counting aperture diameters.....	1-4
2.8. Reagent consumption (ml) .....	1-4
3. Summary of performance data.....	1-5
3.1. Repeatability .....	1-5
3.2. Linearity .....	1-5
3.3. Carryover .....	1-5
4. Reagents specification .....	1-6
4.1. ABX DILUENT .....	1-6
4.2. ABX LYSE .....	1-6
4.3. ABX BIOLYSE .....	1-6
4.4. ABX CLEANER.....	1-7
4.5. ABX EOSINOFIX.....	1-7
4.6. ABX BASOLYSE II .....	1-7
4.7. Waste handling precautions .....	1-8
5. Limitations .....	1-8
5.1. Maintenance .....	1-8
5.2. Blood specimens .....	1-8
5.3. Known interfering substances .....	

## 1. Technical specifications

### 1.1. Parameters

Table 1: CBC Mode

WBC	White Blood Cell
RBC	Red Blood Cell
Hgb	Hemoglobin Concentration
Hct	Hematocrit
MCV	Mean Corpuscular Volume
MCH	Mean Corpuscular Hemoglobin
MCHC	Mean Corpuscular Hemoglobin Concentration
RDW	Red Distribution Width
PLT	Platelets
PDW	Platelets Distribution Width
MPV	Mean Platelet Volume
PCT	Plateletcrit

Table 2: CBC + 5DIFF Mode

WBC	White Blood Cell
LYM	Lymphocytes % and #
MON	Monocytes % and #
NEU	Neutrophils % and #
EOS	Eosinophils % and #
BAS	Basophils % and #
LIC	Large Immature Cell % and #
ALY	Atypical Lymphocytes % and #
RBC	Red Blood Cell
Hgb	Hemoglobin Concentration
Hct	Hematocrit
MCV	Mean Corpuscular Volume
MCH	Mean Corpuscular Hemoglobin
MCHC	Mean Corpuscular Hemoglobin Concentration
RDW	Red Distribution Width
PLT	Platelets
PDW	Platelets Distribution Width
MPV	Mean Platelet Volume
PCT	Plateletcrit

### 1.2. Throughput Analyses

- 80 samples per hour.

### 1.3. Tube identification

- By mean of Keyboard, internal and external Barcode.

## 1.4. Reagents

- ABX DILUENT (20 Litres).
- ABX CLEANER (1 Litre, Integrated).
- ABX EOSINOFIX (1 Litre, Integrated).
- ABX BASOLYSE (1 Litre, Integrated).
- ABX LYSE (0.4 Litre, Integrated).

## 1.5. Internal Computer

- Color LCD touch screen: 12 inches.
- Industrial PC board:
  - .....Windows NT 4.0. for Pentra 80
  - ..... Windows XP for Pentra XL80
- Processor frequency ..... Celeron 433 MHz.
- Memory capacity:
  - ..... 128 Mo for Pentra 80
  - .....256 Mo for Pentra XL80
- Hard drive ..... 20 Go.
- Floppy disk.
- CD ROM drive.
- RS 232C
- USB, Ethernet for Pentra XL80.
- Keyboard.
- Mouse.

## 1.6. Measurements and computation

- Impedance for Wbc, Plt, Rbc, Baso.
- Photometry for Hgb.
- Impedance and light scattering for Lym, Mon; Neu, Eos, Aly and Lic.
- Computation from stored data that was directly measured for Hct, Mcv, Mch, Mchc, Rdw, Mpv, Pct and Pdw.

## 2. Physical specifications

## 2.1. Power requirements

- Power supply .....from 100 Vac to 240 Vac.
  - ..... 50 Hz to 60 Hz.
- Power consumption .....Maximum 230 VA.
- Printer ..... Depends of printer.
  - ..... (See printer's manual).

## 2.2. Operating temperature and humidity

- 16 - 34°C (61-93°F) room temperature.
- Maximum relative humidity 80% for temperature up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F).

## 2.3. Dimension and weight

- Dimensions ..... 82 x 57 x 54 cm.
  - ..... 34.1 x 23.3 x 22 in.
- Weight ..... 55 Kg.
  - ..... 122 lbs.

## 2.4. Minimum specimen volume

- CBC Mode (**CBC**) .....30µl.
- CBC + 5DIFF Mode (**DIF**).....53µl.

## 2.5. dilution ratios

- WBC/BASO..... 1/200.
- LMNE ..... 1/80.
- RBC/PLT ..... 1/10000.
- HGB ..... 1/250.

## 2.6. Hgb measurement

- Hgb chamber, LED 555 nm.
- Modified Drabkin method (cyanmethemoglobin).
- Light source ..... Electroluminescent diode.
- Wavelength .....550nm +/- 10nm.

## 2.7. Counting aperture diameters

- WBC/BASO.....80µm.
- LMNE .....60µm.
- RBC/PLT .....50µm.

## 2.8. Reagent consumption (ml)

Table 3: Reagents consumption

Cycles	Estimated duration (s)	Diluent (ml)	Eosinofix (ml)	Basolyse II (ml)	Cleaner (ml)	Lyse (ml)
CBC/DIFF	0'45"	27.4	1.0	2.0	1.0	0.45
CBC	0'45"	24.4	-	2.0	1.0	0.45
Prime DILUENT	3'00"	44	-	-	-	-
Prime EOSINOFIX	1'34"	1.6	23.7	-	-	-
Prime BASOLYSE 2	1'25"	1.7	-	23.7	1.0	-
Prime CLEANER	1'24"	1.7	-	-	24.7	-
Prime LYSE	1'31"	2.7	-	-	-	8.4
Prime ALL	7'13"	50.7	24.0	24.0	25.0	8.4
STARTUP (1 blank cycle)	2'28"	55.2	2.0	3.0	2.0	0.95
SHUT DOWN	2'56"	32.2	1.0	1.0	14.2	0.49
Rinse CYTOMETER	1'14"	5.0	-	-	-	-
AUTOCLEAN	1'33"	27.6	1.0	1.0	1.0	0.50
MINICLEAN	0'21"	10.3	1.0	2.0	1.0	0.33
CONCENTRATED cleaning	4'00"	29.6	1.0	1.0	1.0	0.50
BACKFLUSH	0'24"	-	-	-	-	-



STARTUP cycle estimated duration and consumptions are given for one blank cycle control. It could be a maximum of three cycles.

### 3. Summary of performance data

#### 3.1. Repeatability

- Based on 10 consecutive samples of the same fresh whole blood sample without alarm:

Table 4: Repeatability

PARAMETERS	%CV	Test Level
WBC	< 2%	at $10 \times 10^3/\mu\text{L}$
RBC	< 2%	at $5 \times 10^6/\mu\text{L}$
Hgb	< 1%	at 15 g/dL
Hct	< 2%	at 45%
Plt	< 5%	at $300 \times 10^3/\mu\text{L}$

#### 3.2. Linearity

Table 5: Linearity

PARAMETERS	Linearity Range	Difference (Which ever is greater)
WBC ( $10^3/\mu\text{L}$ )	0 to $120 \times 10^3/\mu\text{L}$	+/- 0.3 or +/- 7%
RBC ( $10^6/\mu\text{L}$ )	0 to $8 \times 10^6/\mu\text{L}$	+/- 0.07 or +/- 2%
RBC ( $10^6/\mu\text{L}$ )	8 to $18 \times 10^6/\mu\text{L}$	Reportable range
PLT ( $10^3/\mu\text{L}$ )	0 to $1\,900 \times 10^3/\mu\text{L}$	+/- 10 or +/- 7%
PLT Concentrated mode ( $10^3/\mu\text{L}$ )	1500 to $5000 \times 10^3/\mu\text{L}$	+/- 10 or +/- 7 %
HGB (g/dl)	1.3 to 24 g/dl	+/- 0.3 or +/- 2%
HCT (%)	2 to 67 %	+/- 2 or +/- 3%

#### 3.3. Carryover

- Carry-over was tested by analyzing samples with high concentration of WBCs, RBCs, Hgb and PLTs. Each sample was run in triplicate, followed by three background cycles. The % carryover is calculated using the following formula:

$$\text{Carryover} = \frac{\text{Background1} - \text{Background3}}{\text{Sample3} - \text{Background3}} \times 100$$

Table 6: Carryover

	WBC	RBC	Hgb	PLT
Level	43.64	8.56	25.94	739
% Carryover (Actual)	0.00	0.00	0.05	0.28
% Carryover (Claimed)	<0.5%	<0.5%	<0.5%	<0.5%

## 4. Reagents specification



In order for the instrument to operate correctly, high-quality reagents must be used.

**ABX DIAGNOSTICS** provides all the necessary reagents.

All these reagents have been registered by the **A.F.S.S.A.P.S.** «Agence Française de Sécurité Sanitaire des Produits de Santé» according to the procedure relative to laboratory reagents used for biological analyses.

These reagents are used for in vitro diagnostics.

All these reagents are manufactured by:

**ABX DIAGNOSTICS**

Rue du caducée - Parc Euromédecine

34184 MONTPELLIER CEDEX - FRANCE

Tel: (33) 4 67 14 15 16 - Fax: (33) 4 67 14 15 17

### 4.1. ABX DILUENT

- **Function:** This diluent is necessary for the process involved in counting (and differentiating) the blood cells. This reagent is used also to rinse the hydraulic parts of the instrument.
- **Composition:** Stabilized saline solution which contains an organic buffer, an antiseptic and Sodium Azide < 0.1%.
- **Description:** Limpid and odourless aqueous solution.
- **Physico-chemical properties:** Boiling point: About 100°C, pH: neutral.
- **Mesuring Principles:** See user manual.
- **Performances:** See user manual.
- **Results:** See user manual.
- **Directions for use:** See user manual.
- **Handling Precautions:** Avoid skin and eye contact. Use laboratory gloves when handling the reagents. If a large quantity of reagent is ingested a mucous irritation can result.
- **Emergency First aid:** If the eyes or skin come into contact with the reagent, rinse thoroughly with water. If a large quantity is ingested, drink water immediately, and induce vomiting.
- **Storage conditions:** Stored at 18°C (65°F) to 25°C (77°F) away from light.
- **ABX DIAGNOSTICS Part number:** 0901020

### 4.2. ABX LYSE

- **Function:** This reagent is used to lyse blood cells and determine hemoglobin concentration.
- **Composition:** The reagent contains potassium cyanide at 0.03%, a quarternary ammonium salt and a saline phosphate buffer containing sodium azide < 0.1%.
- **Description:** Aqueous solution, limpid.
- **Physico-chemical properties:** Boiling point: approximately 100°C. pH: basic, smells of cyanide.
- **Mesuring Principles:** See user manual.
- **Performances:** See user manual.
- **Results:** See user manual.
- **Directions for use:** See user manual.
- **Handling Precautions:** May be dangerous. Avoid contact with eyes, skin and clothing. Wear laboratory gloves when handling the product. The product may be harmful if ingested. The product can be absorbed through an open wound, or inhalation.
- **Emergency First aid:** If the eyes or skin come into contact with the reagent, rinse with water. If the reagent is inhaled, breathe fresh air immediately. If a large quantity is ingested, drink water immediately, and induce vomiting. Call anti-poison center, or contact doctor.
- **Storage conditions:** Stored at 18°C (65°F) to 25°C (77°F) away from light. Product will degrade if exposed to air, keep cap / probe assembly securely tightened.
- **ABX DIAGNOSTICS Part number:** 0906004

### 4.3. ABX BIOLYSE

- **Function:** This reagent is used to lyse blood cells and determine hemoglobin concentration.
- **Composition:** Quarternary ammonium chloride.

- **Description:** Colorless, odorless.
- **Physico-chemical properties:** pH: 6.65
- **Handling Precautions:** May be dangerous. Avoid contact with eyes, skin and clothing. Wear laboratory gloves when handling the product. The product may be harmful if ingested.
- **Mesuring Principles:** See user manual.
- **Performances:** See user manual.
- **Results:** See user manual.
- **Directions for use:** See user manual.
- **Emergency First aid:** If the eyes or skin come into contact with the reagent, rinse with water. If the product is ingested, call immediately a doctor.
- **Storage conditions:** Stored at 18°C (65°F) to 25°C (77°F) away from light..
- **ABX DIAGNOSTICS Part number:** 0906005

#### 4.4. ABX CLEANER

- **Function:** Washing agent.
- **Composition:** Enzymatic solution with proteolytic action.
- **Description:** Transparent liquid.
- **Physico-chemical properties:** Boiling point: around 100°C. pH: 9.6
- **Handling Precautions:** May be harmful. Avoid contact with eyes, skin and clothing.
- **Mesuring Principles:** See user manual.
- **Performances:** See user manual.
- **Results:** See user manual.
- **Directions for use:** See user manual.
- **Emergency First Aid:** In case the product comes into contact with the eyes, rinse with water. If the product is ingested, call a doctor immediately.
- **Storage conditions:** Stored at 18°C (65°F) to 25°C (77°F).
- **ABX DIAGNOSTICS Part number:** 0903010

#### 4.5. ABX EOSINOFIX

- **Function:** This reagent lyses RBCs, fixes leukocytes and gives a specific coloration to eosinophils.
- **Composition:** Alcoholic solution containing propylene-glycol, a formic dye, buffers, alkaline salts, wetting agents and an aldehyde preservative.
- **Description:** Deep blue aqueous solution, smells of alcohol.
- **Physico-chemical properties:** pH: 6.9
- **Handling precautions:** Avoid contact with eyes, skin and clothing. Wear laboratory gloves when handling the product. The product may be harmful if ingested or inhaled. Keep the bottle closed when not in use.
- **Mesuring Principles:** See user manual.
- **Performances:** See user manual.
- **Results:** See user manual.
- **Directions for use:** See user manual.
- **Emergency First Aid:** If the eyes or skin come into contact with the reagent, rinse with water. If the reagent is inhaled or ingested, call local anti-poison center or contact doctor.
- **Storage conditions:** Room temperature between 18°C (65°F) to 25°C (77°F).
- **ABX DIAGNOSTICS Part number:** 0206010

#### 4.6. ABX BASOLYSE II

- **Function:** This reagent lyses RBCs for the leukocytes and differential count of the polynuclear basophils.
- **Composition:** Acidic solution containing a lytic agent.
- **Description:** Colorless aqueous solution.
- **Physico-chemical properties:** pH: 2.4
- **Handling precautions:** Avoid contact with eyes, skin and clothing. Wear laboratory gloves when handling the product. The product may be harmful if ingested or inhaled. Keep the bottle closed when not in use.

- **Mesuring Principles:** See user manual.
- **Performances:** See user manual.
- **Results:** See user manual.
- **Directions for use:** See user manual.
- **Emergency First Aid:** If the eyes or skin come into contact with the reagent, rinse with water. If the reagent is inhaled, breath fresh air immediately. If a large quantity is ingested, drink water immediately. Do not induce vomiting. Call local anti-poison center or contact doctor.
- **Storage conditions:** Room temperature between 18°C (65°F) to 25°C (77°F).
- **ABX DIAGNOSTICS Part number:** 0906003

#### 4.7. Waste handling precautions

If required, waste can be neutralized before being discarded. Follow your laboratory's protocol when neutralizing and disposing of waste.

### 5. Limitations

#### 5.1. Maintenance

In Chapter 8. **Maintenance**, specific maintenance procedures are listed. The maintenance procedures identified are mandatory for proper use and operation of the **ABX PENTRA 80**.



Failure to execute any of these recommended procedures may result in poor reliability of the system.

#### 5.2. Blood specimens

Verification of any abnormal test result (including flagged results or results outside of the normal range) should be performed using reference methods or other standard laboratory procedures for conclusive verification of the results. The sections below list known limitations of automated blood cell counters which use the principles of impedance and light absorbance as principles of measurement.

#### 5.3. Known interfering substances

##### WBC:

- **White Blood Cells (Leukocytes):** WBC results that exceed the linearity limits of the system will require dilution of the blood sample (Leukemia sample followed by a leukopenia). Re-assaying the diluted sample will help to obtain the correct assay value.
- **Unlysed Red Cells** - In some rare instances, the erythrocytes in the blood sample may not be completely lysed. These non-lysed red blood cells may be detected on the WBC histogram with an L1 alarm or as an elevated baseline on the side (leading edge) of the lymphocytes population. Non-lysed erythrocytes will cause a falsely elevated WBC count.
- **Multiple myeloma** - The precipitation of proteins in multiple myeloma patients may give high WBC counts.
- **Leukemia** - A very low WBC count may result from this disease because of possible increased fragility of the leukocytes leading to destruction of some of these cells during counting. These white cell fragments will also interfere with the white cell differential parameters.
- **Chemotherapy** - Cytotoxic and immunosuppressive drugs may increase the fragility of the leukocytes which may cause low WBC counts.
- **Cryoglobulins** - Increased levels of cryoglobulin that may be associated with myeloma, carcinoma, leukemia, macroglobulinemia, lymphoproliferative disorders, metastatic tumors, autoimmune disorders, infections, aneurism, pregnancy, thromboembolic phenomena, diabetes, etc, which can increase the WBC, RBC or Plt counts and the Hgb concentration. The specimen must be warmed up to 37°C (99°F) in a bain marie for 30 minutes and analyzed again immediately after (analyzer or manual method).
- **Macrothrombocytes** - in excessive numbers may affect and increase Leukocyte numeration.



**RBC:**

- **Red Blood Cells (Erythrocytes):** The red blood cell dilution contains all the formed elements in the blood: erythrocytes, leukocytes and platelets. During erythrocytes counting (red blood cells), platelets are not counted as their size falls below the minimum threshold.
- **Agglutinated erythrocytes** - May cause a low incorrect RBC count. Blood samples containing the agglutinated red blood cells may be suspected by elevated MCH and MCHC values and shown by examination of the stained blood film.
- **Cold agglutinins** - IgM immunoglobulins which are high in cold agglutinin disease may cause lower RBC and Plt counts and increase MCV.

**Hgb (Hemoglobin):**

- **Turbidity of the blood sample** - Any number of physiological and/or therapeutic factors may produce high incorrect Hgb results. To obtain accurate hemoglobin results when increased turbidity of the blood sample occurs, determine the cause of the turbidity and follow the appropriate method below:
- **High WBC:** An extremely high WBC will cause excessive light scatter. In these cases use reference (manual) methods. The diluted sample should be centrifuged, and the supernatant fluid measured with a spectrophotometer.
- **High lipid concentration:** A high concentration of lipids in the blood sample will give the plasma a «milky» appearance. This condition can occur with hyperlipidemia, hyperproteinemia (as in gammopathies) and hyperbilirubinemia. Accurate hemoglobin determinations can be achieved by using reference (manual) methods and a plasma blank.
- **Increased turbidity** may also be seen in cases where the red blood cells are resistant to lysing. This condition will cause an incorrect high Hgb result, but may be detected by observing the abnormal MCH, MCHC values, and the increased baseline on the leading edge of the WBC histogram. Erroneous hemoglobin results will cause the results of the MCH and MCHC to be incorrect as well.
- **Fetal bloods** - The mixing of fetal and maternal bloods may produce a high inaccurate Hgb value.

**Hct (Hematocrit):**

- **Red blood cells agglutination** - May produce an inaccurate Hct and MCV values. Red blood cell agglutination may be detected by observing abnormal MCH and MCHC values, as well as by examination of the stained blood film. In such cases, manual methods may be required to obtain an accurate Hct value.

**MCV (Mean Corpuscular Volume):**

- **Red blood cell agglutination** - May produce an inaccurate MCV value. Red blood cell agglutination may be detected by observing abnormal MCH and MCHC values, as well as by examination of the stained blood film. In such cases, manual methods may be required to obtain an accurate MCV value.
- **Excessive numbers of large platelets** and/or the presence of an excessively high WBC count may interfere with the accurate determination of the MCV value. In such cases, careful examination of the stained blood film may reveal the error.

**MCH (Mean Corpuscular Hemoglobin):**

- The MCH is determined according to Hgb value and the RBC count. The limitations listed for the Hgb and RBC will have an effect on the MCH and may cause inaccurate values.

**MCHC (Mean Corpuscular Hemoglobin Concentration):**

- The MCHC is determined according to the Hgb and Hct values. The limitations listed for the Hgb and Hct will have an effect on the MCHC and may cause inaccurate values.

**RDW (Red blood cell Distribution Width):**

- The red blood cell distribution width is determined according to the RBC count.
- **Nutritional deficiency or blood transfusion** - May cause high RDW results due to iron and/or cobalamin and /or folate deficiency.

**Plt (Platelets):**

- **Very small erythrocytes** (microcytes), erythrocyte fragments (schizocytes) and WBC fragments may interfere with the proper counting of platelets and cause elevated Plt counts.
- **Agglutinated erythrocytes** - May trap platelets, causing an erroneously low platelet count. The presence of agglutinated erythrocytes may be detected by observation of abnormal MCH and MCHC values and by careful examination of the stained blood film.
- **Giant platelets in excessive numbers** - may cause a low inaccurate platelet count as these large

platelets may exceed the upper threshold for the platelet parameter and are not counted.

- **Chemotherapy** - Cytotoxic and immunosuppressive drugs may increase the fragility of these cells which may cause low Plt counts. Reference (manual) methods may be necessary to obtain an accurate platelet count.
- **Hemolysis** - Hemolysed specimens contain red cell stroma which may increase platelet counts.
- **A.C.D. blood** - Blood anticoagulated with acid-citrate-dextrose may contain clumped platelet which could decrease the platelet count.
- **Platelet agglutination** - Clumped platelets may cause a decreased platelet count and/or a high WBC count. The specimen should be recollected in sodium citrate anticoagulant to ensure the anticoagulated character depending on agglutination and reanalyzed only for the platelet count. The final Plt result must be corrected for the sodium citrate dilution effect. However, these platelet clumps do trigger flags L1, LL and LL1.

#### **MPV (Mean Platelet Volume):**

- **Giant platelets** that exceed the upper threshold of the Platelet parameter may not be counted as platelets. Consequently, these larger platelets will not be included in the instrument's calculation of Mean Platelet Volume.
- **Very small erythrocytes** (microcytes), erythrocytic fragments (Schizocytes) and white blood cell fragments may interfere with the proper counting and sizing of Platelets.
- **Agglutinated erythrocytes** - May trap Platelets, causing an incorrect MPV result. The presence of agglutinated erythrocytes may be detected by observation of abnormal MCH and MCHC values and by careful examination of the stained blood film.
- **Chemotherapy** - May also affect the sizing of Plts.



Blood samples collected in EDTA will not maintain a stable Mean Platelet Volume. Platelets collected in EDTA swell depending on the time post-collection and storage temperature.

#### **LYM# (Lymphocyte count absolute value), LYM% (Lymphocyte percentage):**

- The Lymphocyte count is derived from the WBC count. The presence of erythroblasts, certain parasites and erythrocytes that are resistant to lysis may interfere with an accurate LYM count. Limitations listed for the WBC count pertain to the LYM # and % counts as well.

#### **MON# (mononuclear cell count absolute), MON% (Mononuclear percentage):**

- The mononuclear cell count absolute is derived from the WBC count. The presence of large lymphocytes, atypical lymphocytes, blasts and an excessive number of basophils may interfere with an accurate monocyte count.
- Limitations listed for the WBC count pertain to the MON # and % counts as well.

#### **NEU# (neutrophil count absolute), NEU% (Neutrophil percentage):**

- The neutrophils cell count is derived from the WBC cell count. The excessive presence of eosinophils, metamyelocytes, myelocytes, promyelocytes, blasts and plasma cells may interfere with an accurate neutrophils count.

#### **EOS# (Eosinophil cell count absolute), EOS% (Eosinophil percentage):**

- The eosinophil cell count is derived from the WBC cell count. The presence of abnormal granules (degranulated areas, toxic granules...) may interfere with the eosinophil counting.

#### **BAS# (Basophil cell count absolute), BAS% (Basophil percentage):**

- The Basophil cell count is derived from the WBC cell count.

---

## Hydraulic & Pneumatic principles

---

1. Hydropneumatic connections.....	2-2
2. Instrument tubing .....	2-5
2.1. Tube list .....	2-5
2.2. Connectors and integrated tubings list .....	2-7
3. Function of valves .....	2-7
4. Hydraulic circuit .....	2-8
4.1. Cleaner circuit.....	2-9
4.2. Basolyse 2 circuit .....	2-10
4.3. Eosinofix circuit.....	2-11
4.4. Lyse circuit .....	2-12
4.5. Diluent circuit .....	2-13
4.6. Diluent prime circuit .....	2-14
4.7. Counting circuit.....	2-15
4.8. LMNE transfer circuit.....	2-16
4.9. LMNE injection circuit.....	2-17
5. Pneumatic diagram.....	2-18

## 1. Hydropneumatic connections

Read this table as follow: LV3\_2 means connection to port 2 of valve 3.

Table 1: Hydropneumatic connection

Circuit	From	F.S.	Diameter	Length	T.S.	To
AIR	Atmosphere		2.05	140		LV14_2
	LV14_1		1.52	70		Count syringe_1
	Rinse chamber_1 - Atmos.		2.05	550		LV17_2
	LV17_1		1.52	30		T8_1
	Atmosphere		2.05	80		LV19_1
	LV19_3		1.52	500		Diluent reservoir_2
	LV19_2		1.52	60		T8_3
	T8_2		1.52	230		Drain syringe # 2_1
	Atmosphere		2.05	70		LV21_2
	LV21_1		1.30	185		Isolator_2
	Rinse chamber_2 - Atmos.		2.05	300		LV24_2
	LV24_1		1.52	90		Drain syringe # 1_1
DILUENT REAGENT	ABX Diluent container		C 3x6	maxi. 2000		Diluent input
	Diluent input		2.54	190	S	LV29_2
	LV29_1	S	2.54	180	S	Diluent reservoir_4
			2.05	65		Diluent reservoir_1
	Diluent reservoir_1		2.05	370		LV2_1
	LV2_3	S	2.05	120		LMNE syringe_2
	LV3_2	S	1.52	50	S	LV3_3
	LV3_1	S	1.52	60	S	LV1_3
	LV1_1	S	1.52	200	S	Isolator_1
	Isolator_2	S	1.52	100		T1_1
	T1_2		1.14	35		LMNE flow cell_4
	T1_2		Xba403a			LMNE flow cell_4
	T1_3		1.14	35		LMNE flow cell_2
	T1_3		Xba403a			LMNE flow cell_2
	LV1_2		1.52	300		T6_3
	LV2_2		1.02	175		LMNE syringe_4
	LMNE syringe_1		1.02	205		LMNE flow cell_5
	LMNE flow cell_7		1.02	10		(Cap)
			2.05	65		Diluent reservoir_3
	Diluent reservoir_3		2.05	610		LV10_1
	LV10_3		2.05	160		Reagent syringe_4
	LV10_2		1.52	50		LV11_3
	LV11_1		1.52	15		T5_2
	T5_1		1.52	760		LV22_3
	LV22_1		1.52	50		LV23_3
	LV23_1		1.52	190		T3_1
	T3_3		1.52	75		Probe rinse block_1
	T3_2		1.30	15		Isolator_1
	Isolator_3		1.52	215		LV20_1

Table 1: Hydropneumatic connection

Circuit	From	F.S.	Diameter	Length	T.S.	To
	LV20_2		1.52	760		T7_1
	LV23_2		1.52	300		Probe rinse block_2
	LV22_2		1.02	115		Sample syringe_2
	LV11_2		1.52	440		LV25_3
	LV25_1		1.52	65		LV27_3
	LV27_1		1.52	50		LV26_3
	LV26_1		1.52	200	S	Reagent heater_7
	Reagent heater_8	S	1.52	160		RBC chamber_1
	LV26_2		1.52	260	S	Reagent heater_1
	Reagent heater_2	S	1.52	160		DIL1/HGB chamber_1
	LV27_2		1.52	50		T10_2
	LV25_2		1.52	170		WBC/Baso chamber_4
ABX CLEANER REAGENT	Abx Cleaner bottle		2.05	800		LV8_1
	LV8_3		2.05	160		Reagent syringe_2
	LV8_2		1.52	70		LV6_3
	LV6_1		1.52	300		T10_3
	T10_1		1.52	180		WBC/Baso chamber_1
	LV6_2		1.52	120		T5_3
ABX EOSINO-FIX REAGENT	Abx Eosinofix bottle		2.05	800		LV9_1
	LV9_3		2.05	160		Reagent syringe_3
	LV9_2		1.52	550	S	Reagent heater_3
	Reagent heater_4	S	1.52	160		LMNE chamber_3
ABX BASO-LYSE II REAGENT	Abx Basolyse II bottle		2.05	800		LV12_1
	LV12_3		2.05	160		Reagent syringe_5
	LV12_2		1.52	575	S	Reagent heater_10
	Reagent heater_9	S	1.52	60	S	Reagent heater_11
	Reagent heater_12	S	1.52	160		WBC/Baso chamber_2
ABX ALPHA-LYSE REAGENT	Abx Alphalyse bottle		1.52	800		LV7_1
	LV7_3		1.52	160		Reagent syringe_1
	LV7_2		1.52	480		DIL1/HGB chamber_2
SAMPLING	Probe_1		1.02	205		Sample syringe_1
	Probe_1				S	Sample syringe_1
LMNE COUNTING	LMNE chamber_4		1.30	20		M4_2 photocell
	M4_1 photocell		1.30	320		LV4_1
	LV4_2		1.02	130		T2_2
	T2_3		1.02	250		LMNE syringe_5
	LMNE syringe_3		1.14	85		T4_1
	T4_2		1.02	15		LV5_1
	LV5_2		1.52	280		T7_2
	T2_1	S	1.85	10		LMNE flow cell_6
			0.19	4		LMNE flow cell_6

Table 1: Hydropneumatic connection

Circuit	From	F.S.	Diameter	Length	T.S.	To
	LMNE flow cell_output		1.52	20		E1_1 anode fitting
	E1_2 anode fitting		1.52	70		Isolator_1
	Isolator_2		1.52	80		E2_1 ground fitting
	E2_2 ground fitting		1.52	335		LV28_2
	LV28_1		1.52	120		T6_2
	T6_1		1.52	160	S	Reagent heater_5
	Reagent heater_6	S	1.52	160		LMNE chamber_2
WBC/RBC COUNTING	WBC/Baso chamber_3		1.52	200		RBC chamber_3
	RBC chamber_2		1.52	480		LV15_2
	LV15_1		1.52	70		Count syringe_2
WASTE	Rinse chamber_3		2.05	20		Filter_1
	Filter_2		2.05	100		LV31_2
	LV31_1		1.52	30		T12_3
	DIL1/HGB chamber_3		1.52	65		LV32_2
	LV32_1		1.52	15		T12_2
	T12_1		1.52	35		T13_3
	RBC chamber_4		1.52	65		LV34_2
	LV34_1		1.52	15		T13_2
	T13_1		1.52	180		M2_1 photocell
	M2_2 photocell		1.52	15		Isolator # 2_1
	Isolator # 2_2		2.05	280		LV30_1
	LV30_3	S	2.54	160	S	Drain syringe # 1_2
	LV30_2	S	2.54	150		T14_3
	LMNE chamber_5		1.52	65		LV33_2
	LV33_1		1.52	60		E3_1
	E3_2		1.52	60		T11_1
	T7_3		1.52	100		T11_3
	T11_2		1.52	15		M1_1 photocell
	M1_2 photocell		1.52	15		Isolator # 1_1
	Isolator # 1_2		2.05	500		LV18_1
	LV18_3		2.05	210		Drain syringe # 2_2
	LV18_2	S	2.54	150		T9_2
	WBC/Baso chamber_5		1.52	50		LV35_2
	LV35_1		1.52	130		M3_1 photocell
	M3_2 photocell		1.52	15		Isolator # 3_1
	Isolator # 3_2		2.05	460		Count syringe_3
	T4_3		1.02	150		LV13_1
	LV13_2		2.05	140		Count syringe_4
	Count syringe_5		2.05	120		LV16_1
	LV16_2	S	2.54	150		T9_3
	T9_1		2.54	225		T14_2
	T14_1		2.54	20		Waste output
	Waste output		C 4x6	maxi. 2000		Waste container

## 2. Instrument tubing

### 2.1. Tube list

Table 2: Tube list

Designation	Part Number	Diameter	Length	Quantity	Comment
Y Connector	EAB021A	3		2	
Y Connector	EAB026A	2.5		2	
T410-6 Connector	EAB033A	1.6		2	
T220-6 Connector	EAB035A	2.3		8	
0.040 TYGON tubing	EAE005A	1.02	10	1	
		1.02	15	1	
		1.02	85	1	
		1.02	115	1	
		1.02	130	1	
		1.02	150	1	
		1.02	175	1	
		1.02	205	2	
0.051 TYGON tubing	EAE006A	1.02	240	1	
		1.30	15	1	
		1.30	20	1	
		1.30	185	1	
0.060 TYGON tubing	EAE007A	1.30	320	1	
		1.52	15	7	
		1.52	20	1	
		1.52	30	2	
		1.52	35	1	
		1.52	50	6	
		1.52	60	5	
		1.52	65	4	
		1.52	70	4	
		1.52	75	1	
		1.52	80	1	
		1.52	90	1	
		1.52	100	2	
		1.52	120	2	
		1.52	130	1	
		1.52	160	7	
		1.52	170	1	
		1.52	180	2	
		1.52	190	1	
		1.52	200	3	
		1.52	215	1	
		1.52	230	1	
		1.52	260	1	

Table 2: Tube list

Designation	Part Number	Diameter	Length	Quantity	Comment
		1.52	280	1	
		1.52	300	3	
		1.52	335	1	
		1.52	440	1	
		1.52	480	1	
		1.52	500	1	
		1.52	550	1	
		1.52	575	1	
		1.52	760	2	
		1.52	800	1	
0.081 TYGON tubing	EAE008A	2.05	20	1	
		2.05	65	2	Notched tubing
		2.05	70	1	Notched tubing
		2.05	80	1	Notched tubing
		2.05	100	1	
		2.05	120	2	
		2.05	140	1	
		2.05	140	1	Notched tubing
		2.05	160	4	
		2.05	210	1	
		2.05	280	1	
		2.05	300	1	
		2.05	370	1	
		2.05	460	1	
		2.05	500	1	
		2.05	550	1	
		2.05	610	1	
		2.05	800	3	
CRISTAL tubing	EAE011A	3x6	maxi 2000	1	
CRISTAL tubing	EAE028A	4x6	maxi 2000	1	
0.045 TYGON tubing	EAE033A	1.14	35	2	
0.100 TYGON tubing	EAE034A	2.54	20	1	
		2.54	150	3	
		2.54	160	1	
		2.54	180	1	
		2.54	190	1	
		2.54	225	1	
0.0075 TYGON tubing	EAE047A	0.19	4	1	
0.073 TYGON tubing	EAE048A	1.85	10	1	
Sleeving	GAL098A			30	S2x4 Lg=6 tubing EAE026A
Tube shielding	XBA403A			2	



## 2.2. Connectors and integrated tubings list

The following table shows the connectors and integrated tubings list: Length x Quantity per diameter.

Table 3: Connectors and integrated tubings list

Designation	Part Number	Diameter	Length	Qty	Comment
Y Connector	EAB021A	3		2	
Y Connector	EAB026A	2.5		2	
T410-6 Connector	EAB033A	1.6		2	
T220-6 Connector	EAB035A	2.3		8	
0.040 TYGON tubing	EAE005A	1.02	1330	1	
0.051 TYGON tubing	EAE006A	1.30	540	1	
0.060 TYGON tubing	EAE007A	1.52	11700	1	
0.081 TYGON tubing	EAE008A	2.05	7240	1	
CRISTAL tubing	EAE011A	3x6	maxi 2000	1	
CRISTAL tubing	EAE028A	4x6	maxi 2000	1	
0.045 TYGON tubing	EAE033A	1.14	70	1	
0.100 TYGON tubing	EAE034A	2.54	1225	1	
0.0075 TYGON tubing	EAE047A	0.19	4	1	
0.073 TYGON tubing	EAE048A	1.85	10	1	
Sleeving	GAL098A			30	S2x4 Lg=6 tubing EAE026A
Tube shielding	XBA403A			2	

## 3. Function of valves

Table 4: Function of valves

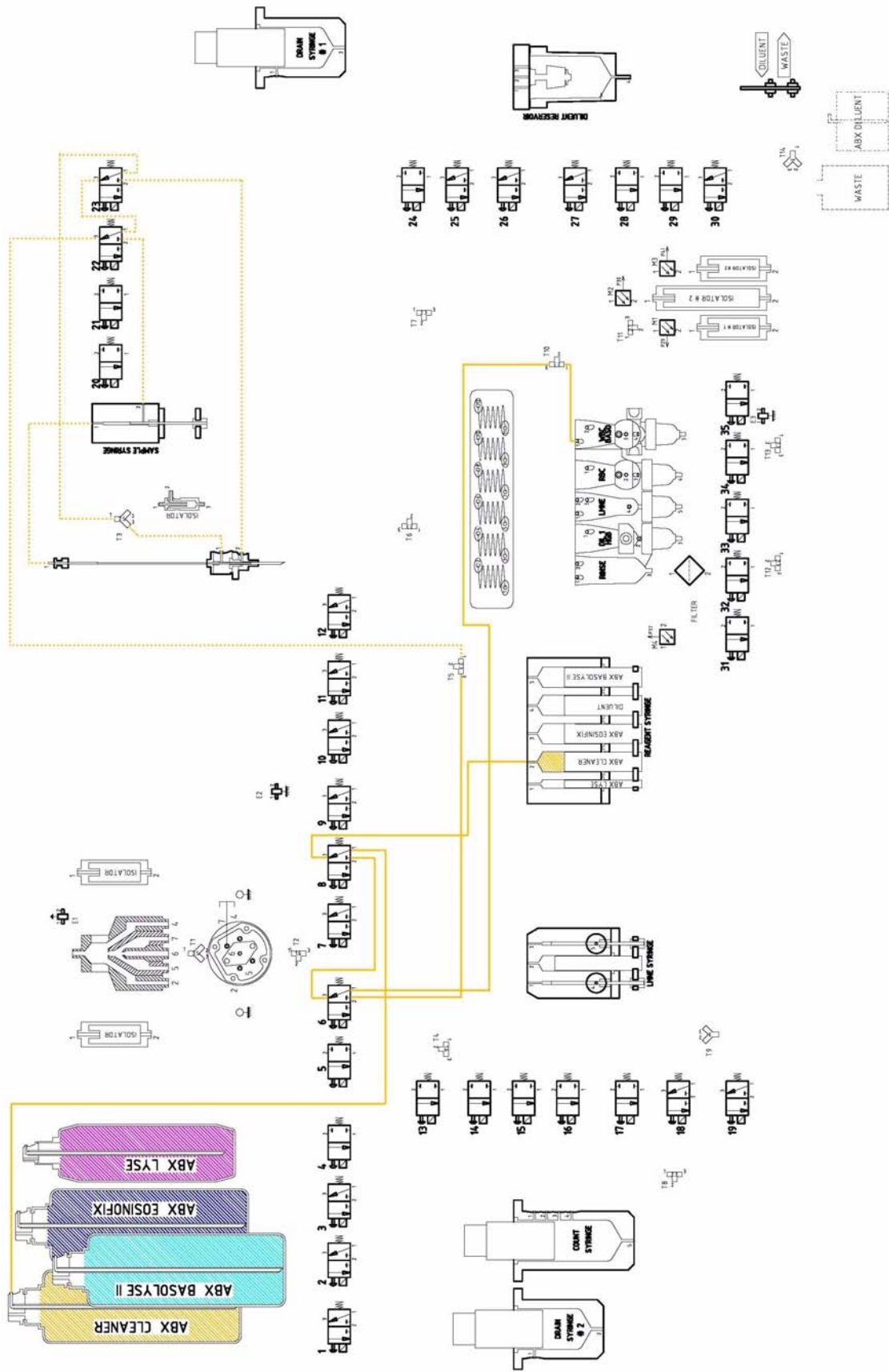
Valve number	Subject	Functions
1	Diferencial diluent	Selects flowcell sheath 2 or LMNE chamber
2	Diferencial diluent	
3	Diferencial diluent	Selects flowcell sheath 1 or sheath 2
4	Flowcell sample supply	Opens pathway from LMNE chamber to flowcell
5	Flowcell sample injector	Opens waste path for sample LMNE syringe
6	Rinse output control	Selects rinse for probe rinse block or WBC\Baso chamber
7	Alphalyse	Control alphalyse entry\exit reagent syringe

Table 4: Function of valves

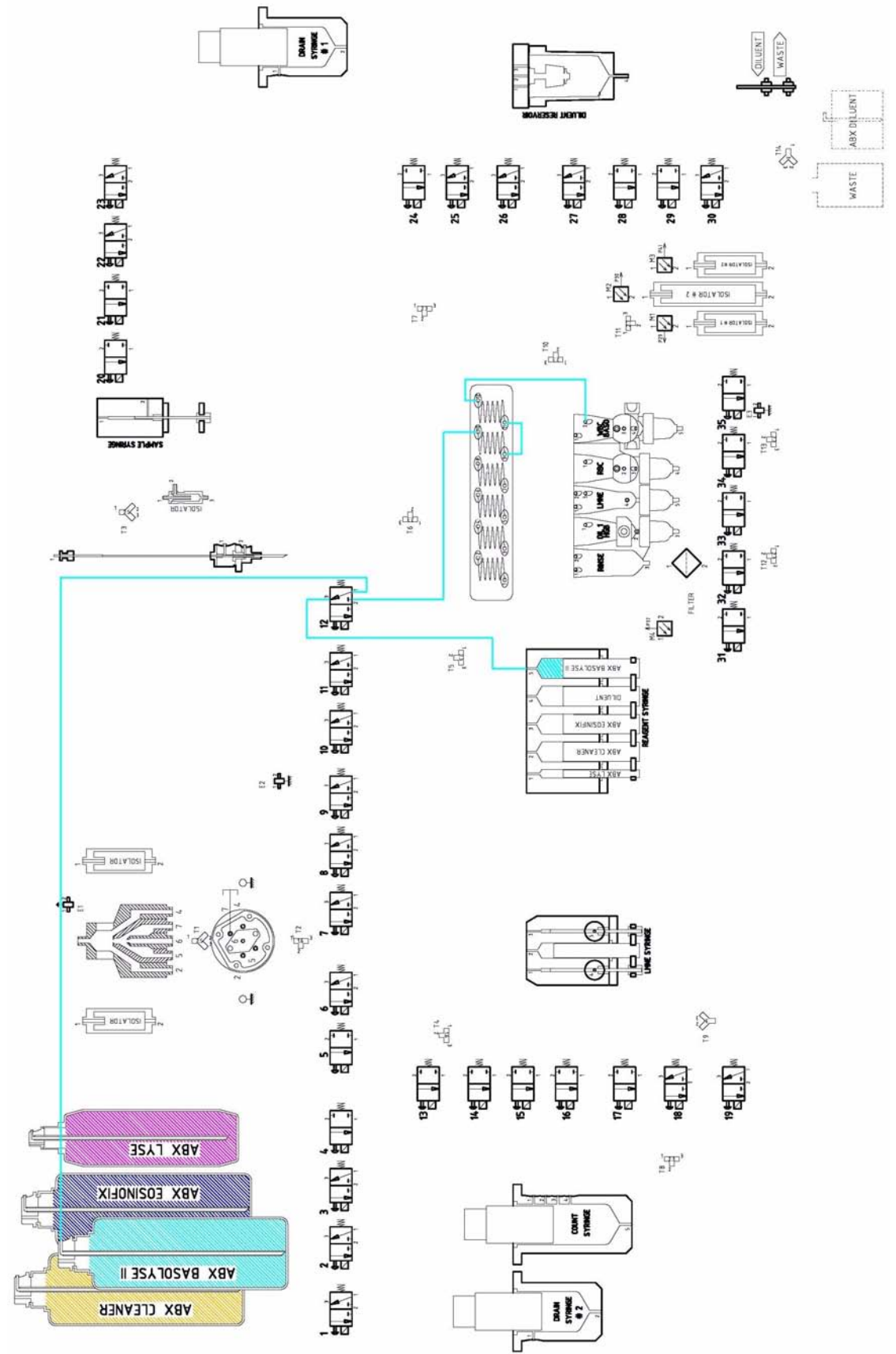
Valve number	Subject	Functions
8	Cleaner	Control cleaner entry\exit reagent syringe
9	Eosinofix	Control eosinofix entry\exit reagent syringe
10	Diluent	Control alphalyse entry\exit reagent syringe
11	Diluent ouput control	Routes diluent to probe rinse block or heating coil
12	Basolyse II	Control basolyse II entry\exit reagent syringe
13	Flowcell rinse	Routes diluent from flowcell and LMNE syringe to counting syringe
14	Counting syringe	Set counting syringe to atmosphere
15	WBC and RBC\Pit count	Opens vacuum count line for WBC and RBC chambers
16	Counting syringe	Drain for counting syringe
17	Draining syringe #2	Set draining syringe #2 to atmosphere (through Rinse chamber)
18	Draining syringe #2	Drain for draining syringe #2
19	Diluent reservoir	Fill diluent tank or set diluent tank to atmosphere
20	Probe	Probe cleaning
21	Probe	Flushing out of probe rinsing block
22	Probe	Direct diluent into interior or exterior of probe
23	Probe	Probe cleaning
24	Draining syringe #1	Set draining syringe #1 to atmosphere (through Rinse chamber)
25	WBC\Baso Counting head	Routes diluent to heating coil or sweep flow for counting head
26	Diluent chamber select	Routes diluent (via heating coil) to Hgb or RBC chamber
27	Diluent circuit	Fill WBC\Baso chamber with diluent
28	Flowcell drain	Opens path from flowcell output to LMNE chamber for drain
29	Diluent circuit	Entry of diluent
30	Counting syringe	Flushing\Draining of the counting syringe
31	Chambers	Drain for rinse chamber
32	Chambers	Drain for first dilution chamber
33	Chambers	Drain for LMNE chamber
34	Chambers	Drain for RBC chamber
35	Chambers	Drain for WBC\Baso chamber

#### 4. Hydraulic circuit

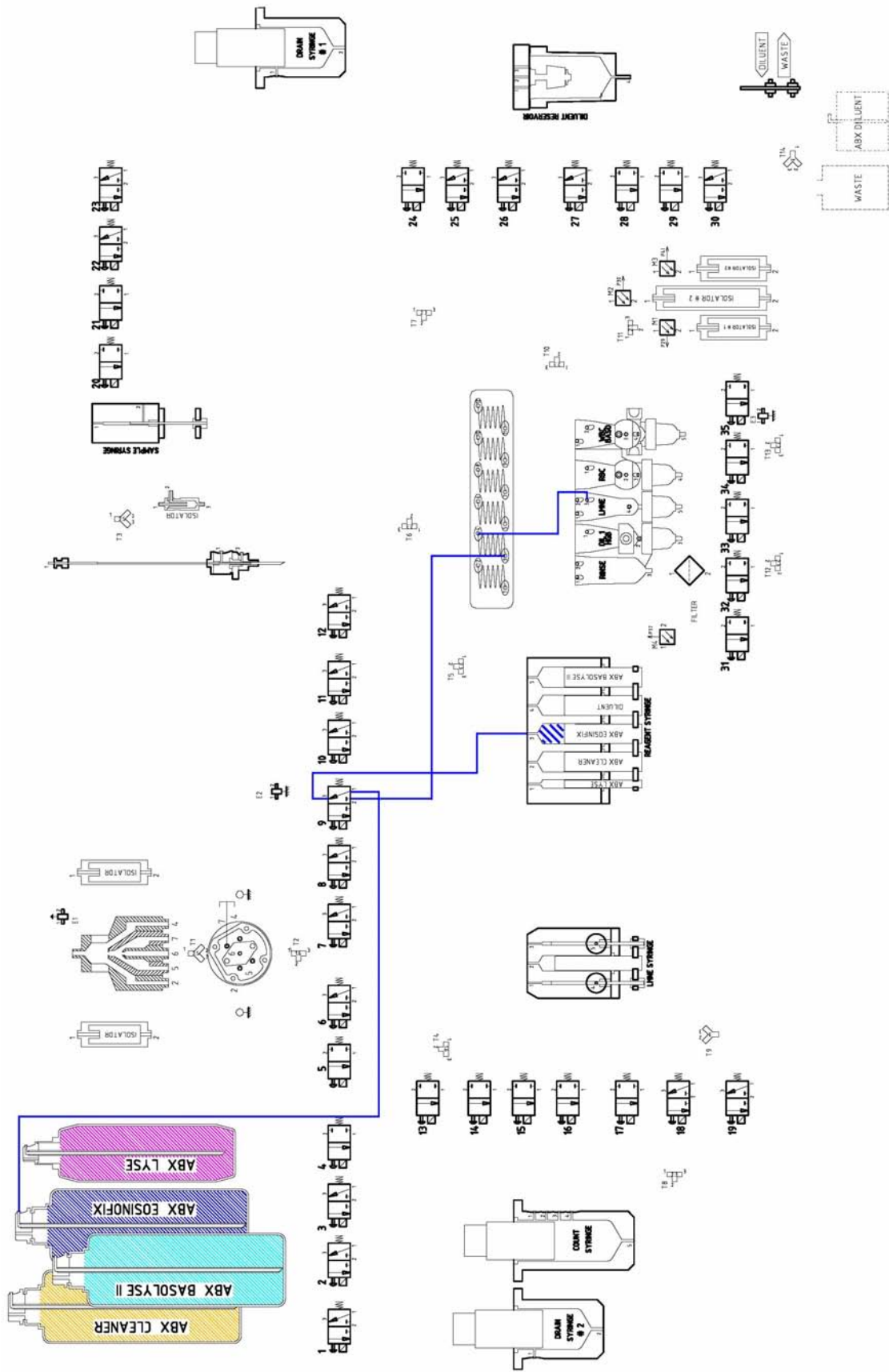
4.1. Cleaner circuit



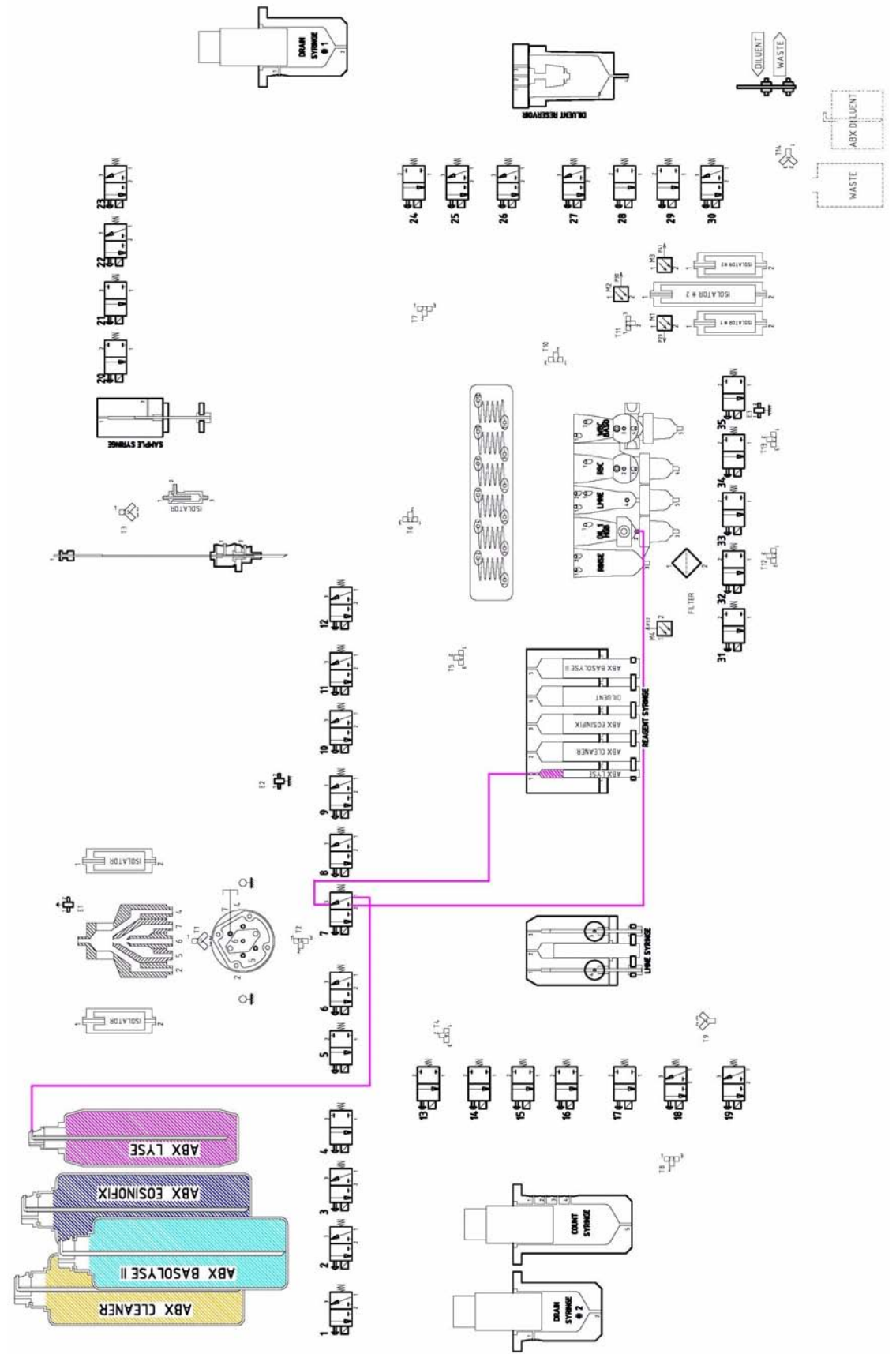
4.2. Basolyse 2 circuit



4.3. Eosinofix circuit

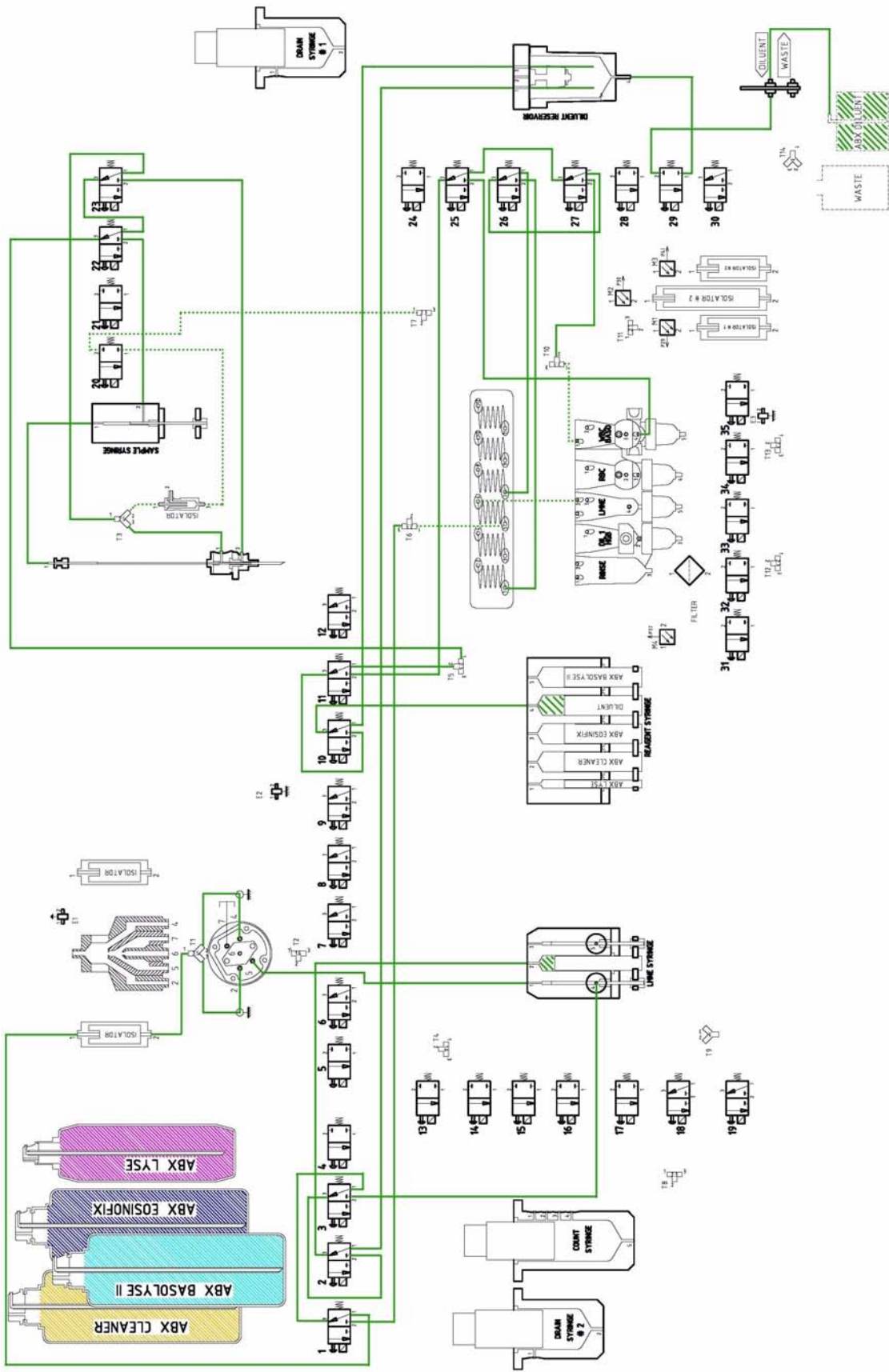


4.4. Lyse circuit

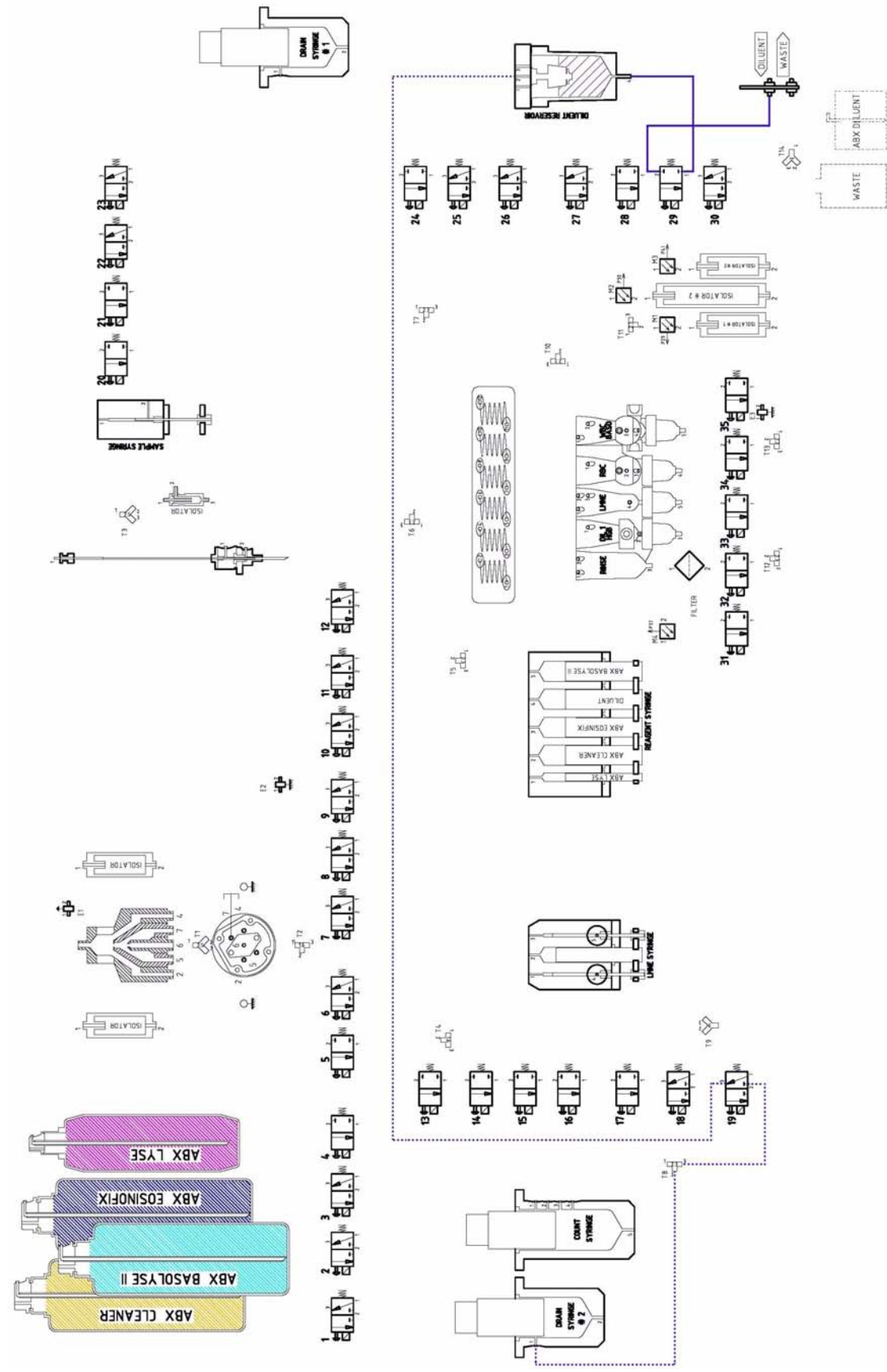




4.5. Diluent circuit

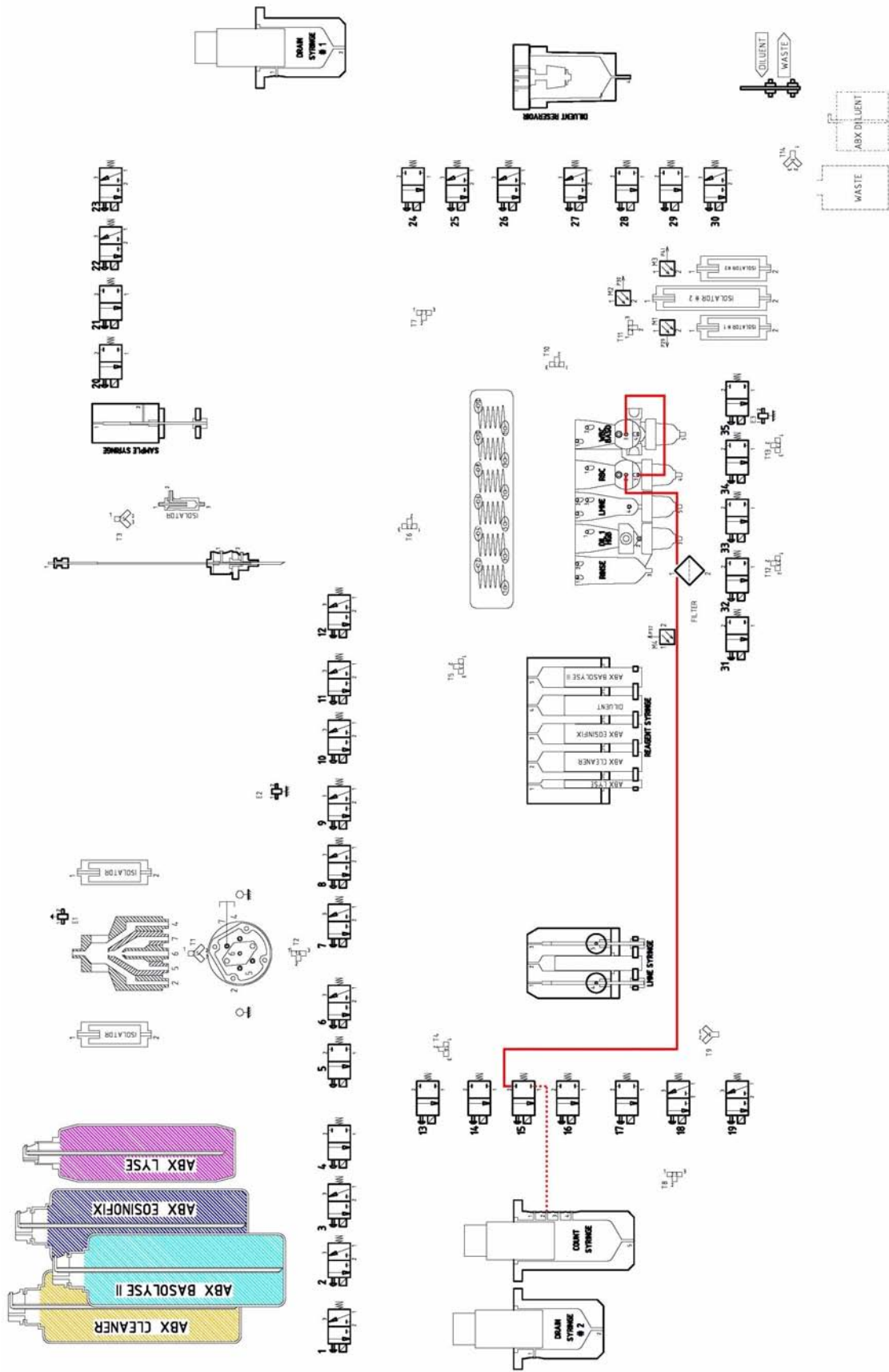


4.6. Diluent prime circuit

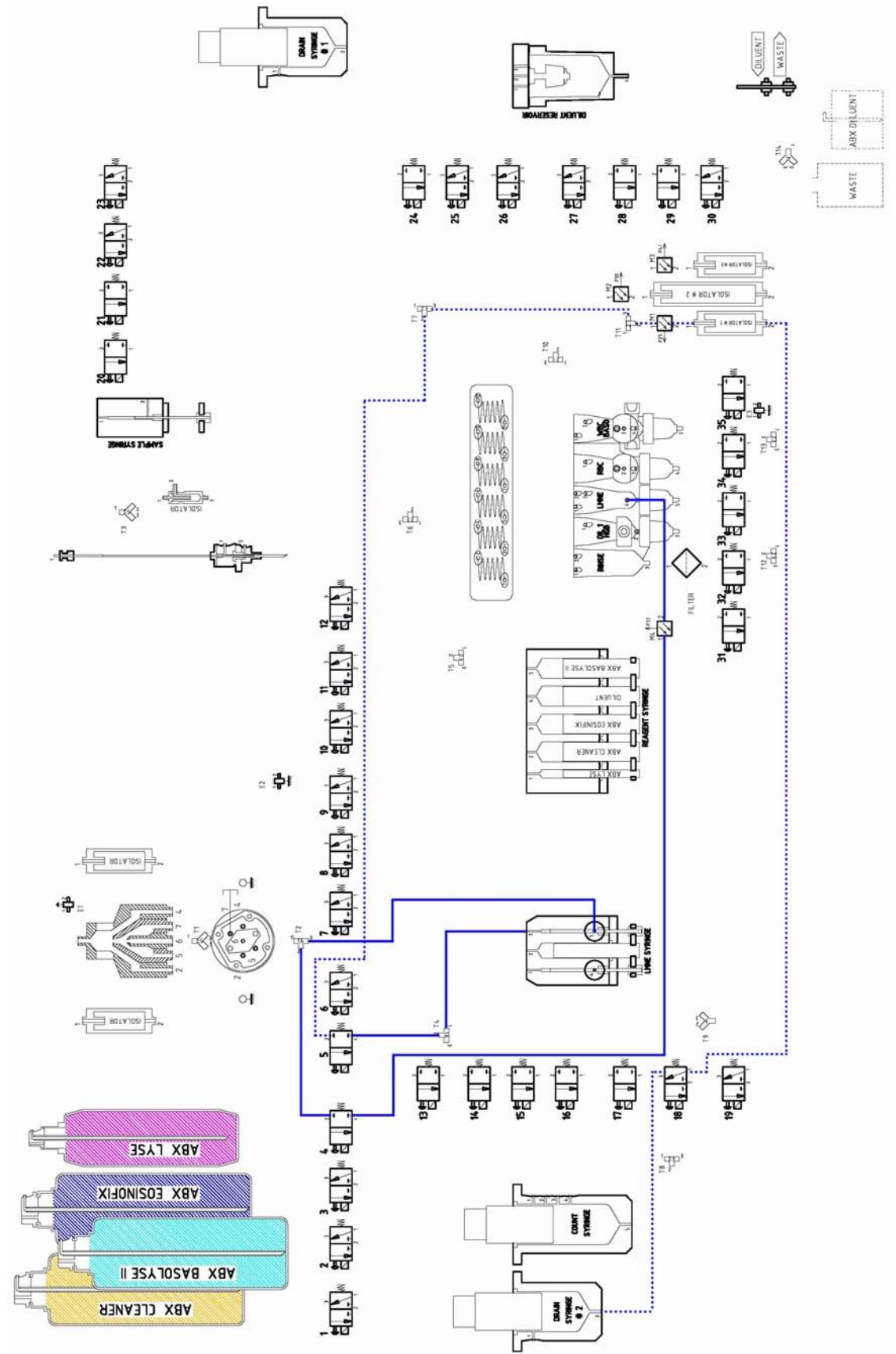




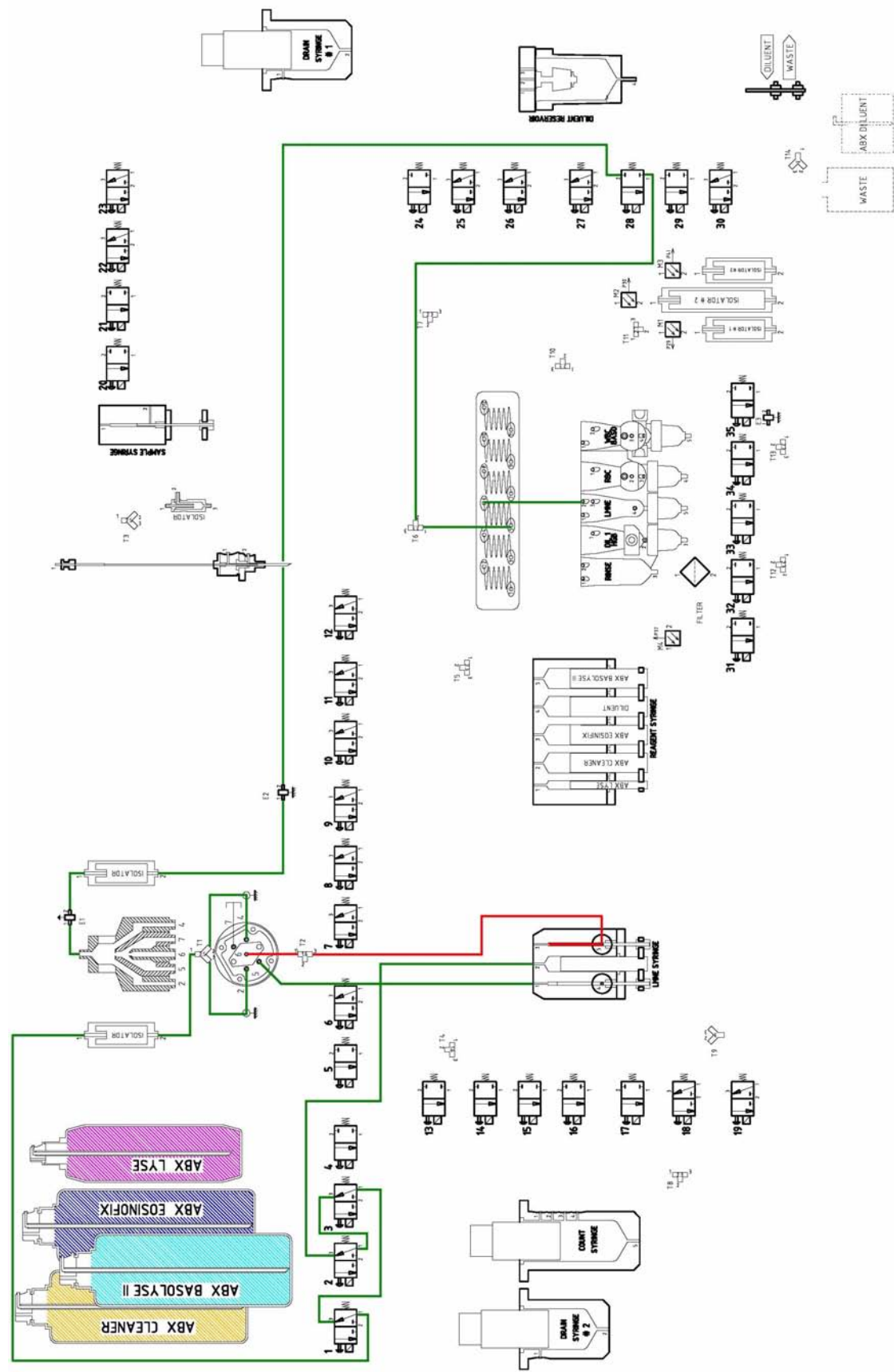
4.7. Counting circuit



4.8. LMNE transfer circuit

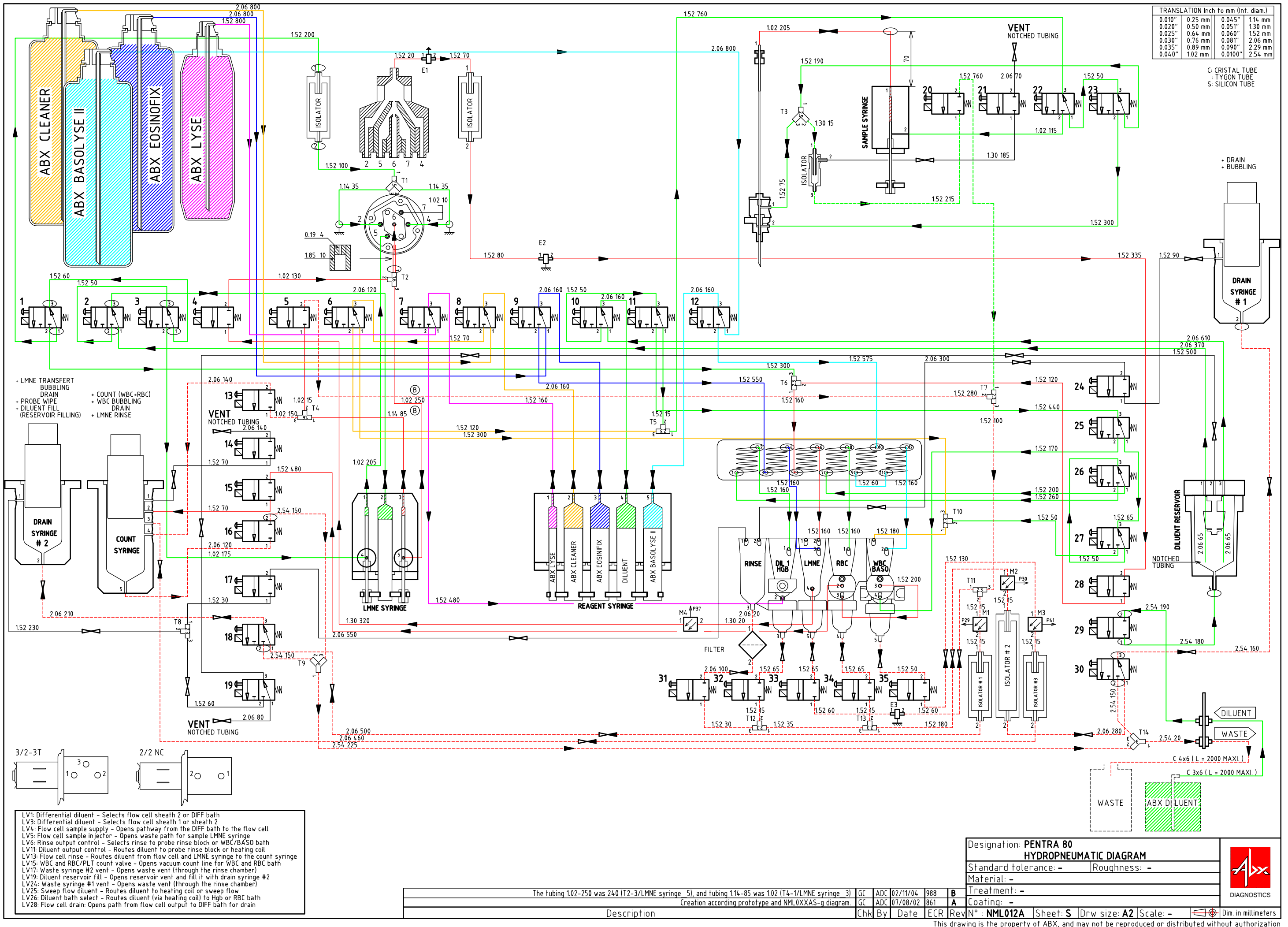


4.9. LMNE injection circuit



## 5. Pneumatic diagram

See pneumatic diagram on next page.





## Electric & Electronic principles

1. Main board .....	3-3
1.1. Main board general view .....	3-3
2. Motor board .....	3-4
2.1. Motor board general view .....	3-4
3. Connectors and other boards .....	3-4
3.1. CBC008A Barcode reader .....	3-5
3.2. DAD075AS Flat cable 350mm. 14pts .....	3-6
3.3. DAD107AS Flat cable 480mm. 14pts .....	3-7
3.4. DAD109A Flat cable 560mm. 14pts .....	3-8
3.5. DAD112AS Flat cable 930mm. 26pts (Main board\Carriage board) .....	3-9
3.6. DAD119AS Flat cable 950mm. 8pts .....	3-10
3.7. DAD120A Flat cable 800mm. 14pts .....	3-11
3.8. DAD121A Flat cable 700mm. 44pts .....	3-12
3.9. DAD122A Flat cable 650mm. 14pts .....	3-13
3.10. DAD123A DSUB 25pts Flat cable 1000mm. ....	3-14
3.11. DAD124A DSUB 9pts Flat cable 1000mm. ....	3-15
3.12. XAA428C Carriage board .....	3-16
3.13. XAA429A LEDs board .....	3-17
3.14. XAA456A Main board .....	3-18
3.15. XAA458A LMNE amplifier board .....	3-19
3.16. XAA459A Motor board .....	3-20
3.17. XAA478A Solenoid board .....	3-21
3.18. XBA322B External waste level detection .....	3-22
3.19. XBA342A Infrared sensor .....	3-23
3.20. XBA387A Reagent heating coil .....	3-24
3.21. XBA389A Hemoglobin photometer .....	3-25
3.22. XBA393A Upper fan .....	3-26
3.23. XBA396A Infrared 260mm .....	3-27
3.24. XBA398B RBC&WBC electrode coaxial cable .....	3-28
3.25. XBA399B LMNE flowcell coaxial cable .....	3-29
3.26. XBA425A Chamber heating .....	3-30
3.27. XBA427A Emergency position assy .....	3-31
3.28. XBA431A Infrared photocell 600mm. (No tab) .....	3-32

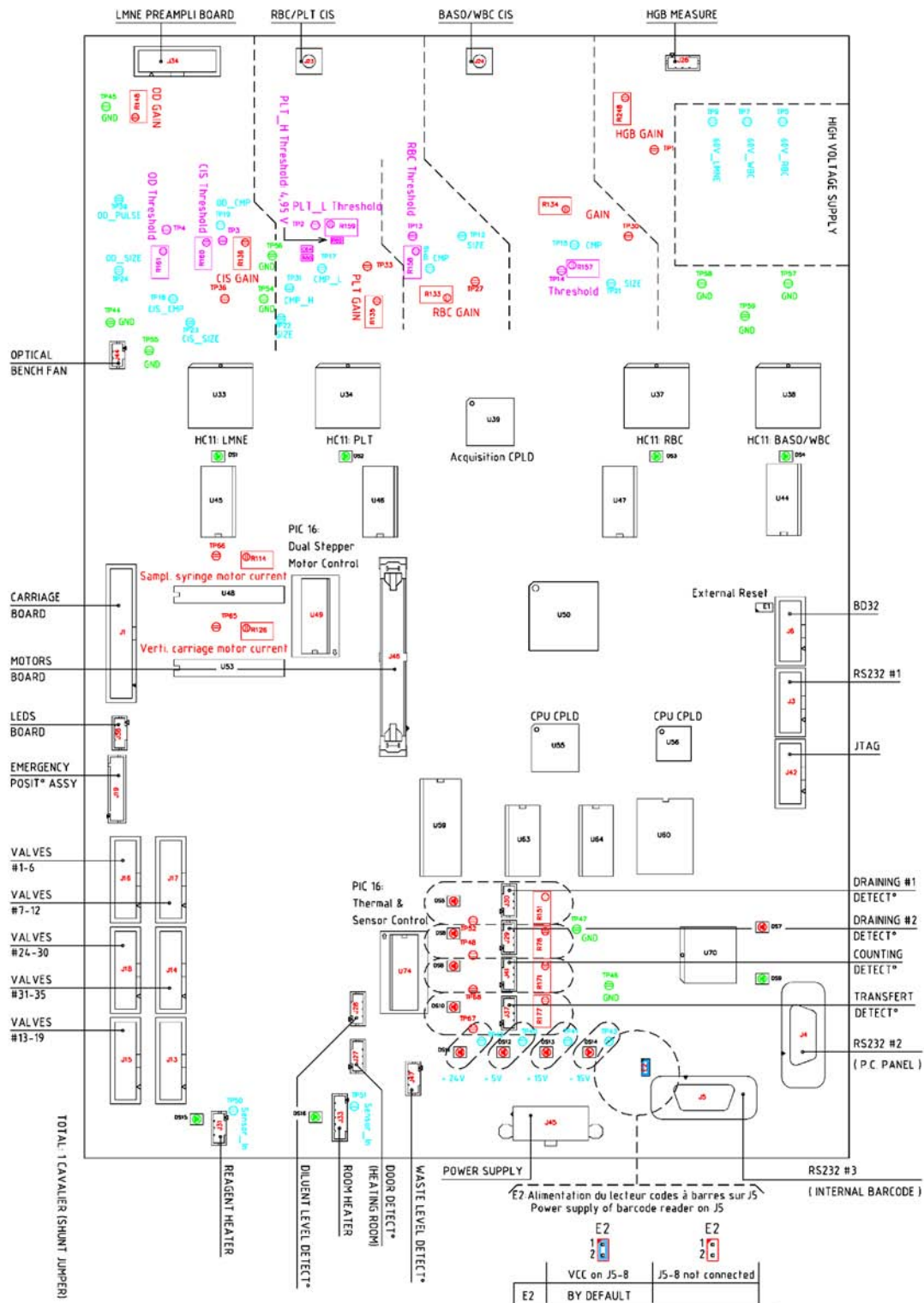


3.29. XBA432A Infrared photocell 600mm. (2 tabs).....	3-33
3.30. XBA433A Infrared photocell 600mm. (1 tab) .....	3-34
3.31. XBA458A Switch JST 300mm. ....	3-35
3.32. XBA459A Switch JST 400mm. ....	3-36
3.33. XBA460A Switch Jst 500mm.....	3-37
3.34. XBA461A Switch Jst 700mm.....	3-38
3.35. XBA462A Motor Jst 300mm.....	3-39
3.36. XBA463A Motor Jst 400mm.....	3-40
3.37. XBA464A Motor Jst 500mm.....	3-41
3.38. XBA465A Motor Jst 700mm.....	3-42
3.39. XBA469A Horizontal carriage cell extension .....	3-43
3.40. XBA470A Solenoid JST 700mm. ....	3-44
3.41. XBA471A Solenoid Molex 230mm. ....	3-45
3.42. XBA478A Horizontal carriage motor .....	3-46
3.43. XBA486A LEDs extension JST 1000mm. ....	3-47
3.44. XBA487A LED JST 200mm. ....	3-48
3.45. XBA488A Waste level detection .....	3-49
3.46. XDA605A Diluent reservoir with level detection .....	3-50
3.47. XDA751C 12 valves assy (LV1-6 & LV7-12).....	3-51
3.48. XDA752C 7 valves assy (LV13-19).....	3-52
3.49. XDA753C Carriage valves assy (LV20-23).....	3-53
3.50. XDA754C 7 valves assy (LV24-30).....	3-54
3.51. XDA755C 5 valves assy (LV31-35).....	3-55
4. Pentra 80 synoptic.....	3-55



## 1. Main board

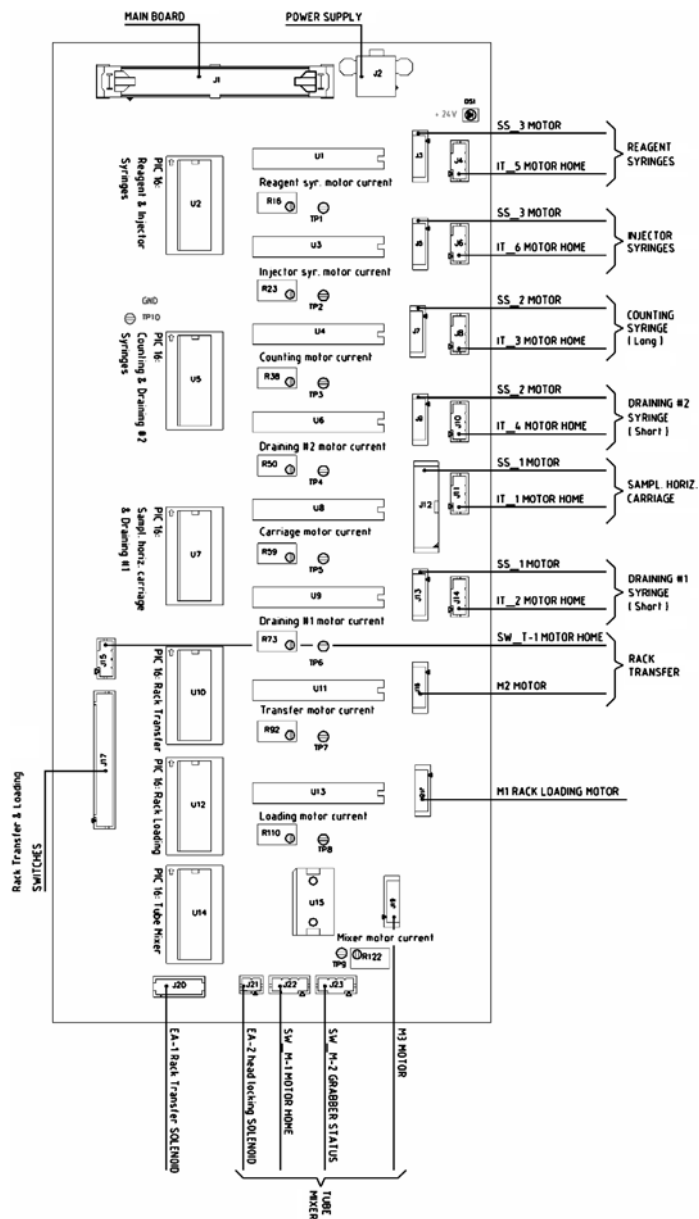
## 1.1. Main board general view



Diag.1: Main board general view

2. Motor board

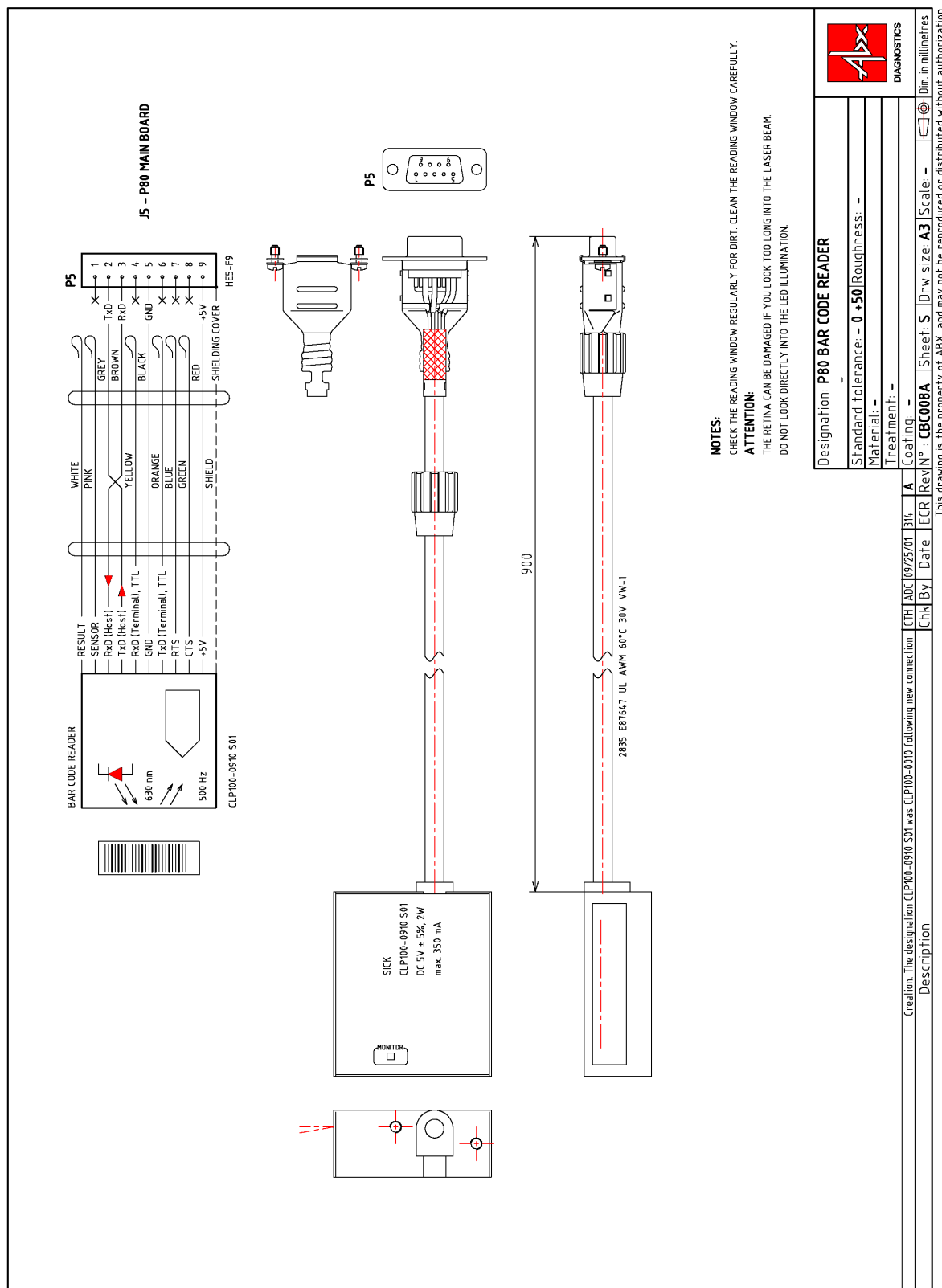
2.1. Motor board general view



Diag.2:Motor board general view

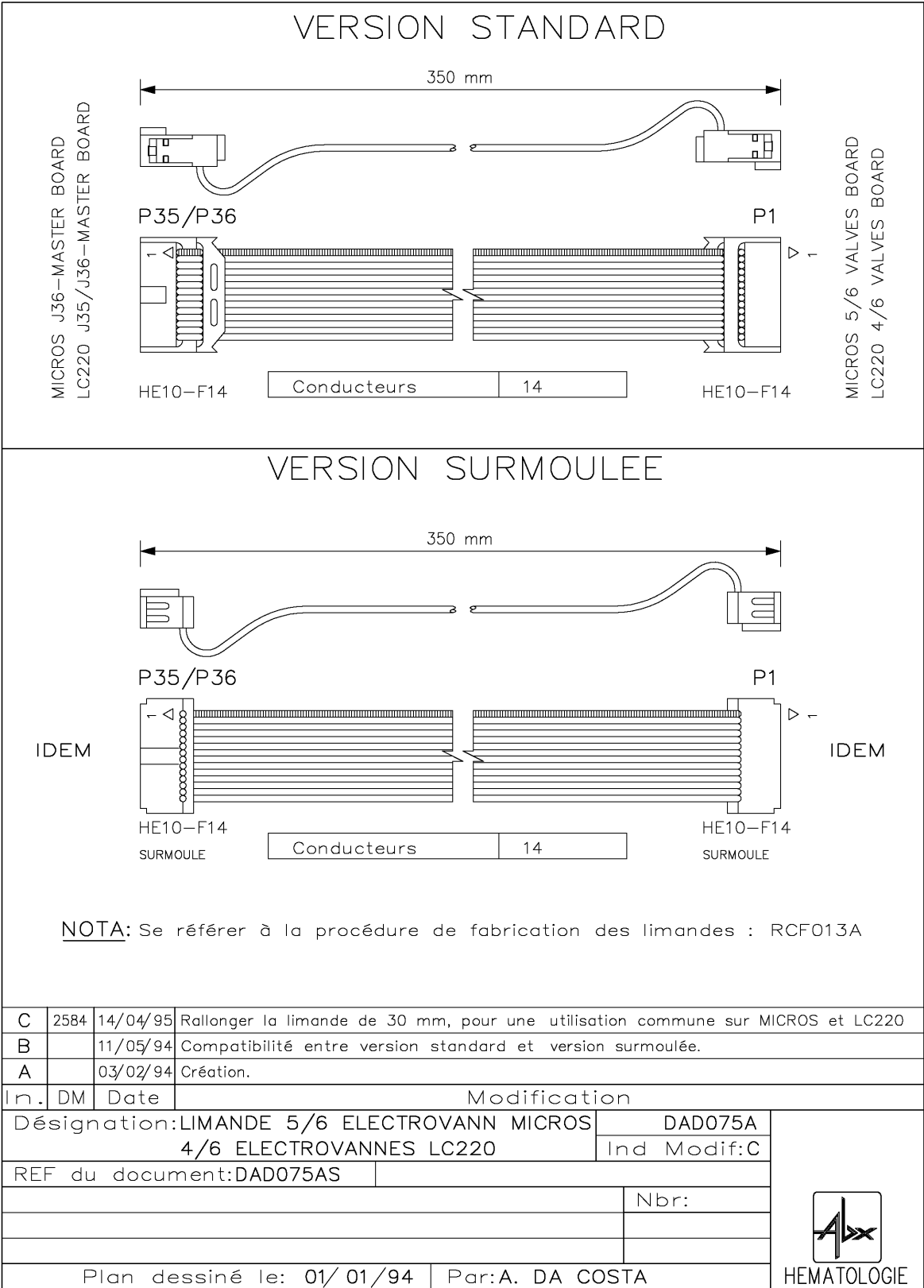
3. Connectors and other boards

### 3.1. CBC008A Barcode reader

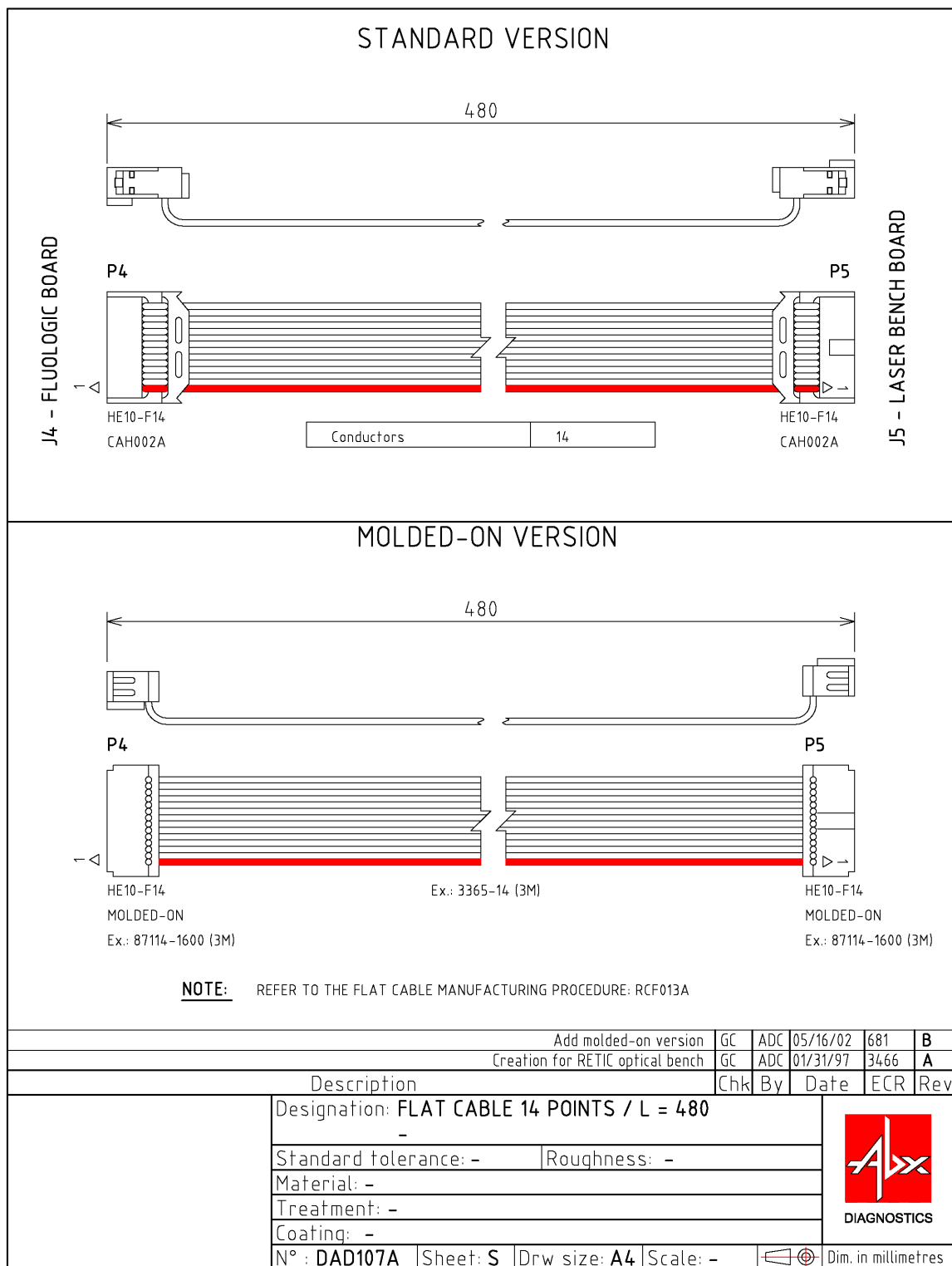


Diag.3:CBC008A Barcode reader

3.2. DAD075AS Flat cable 350mm. 14pts



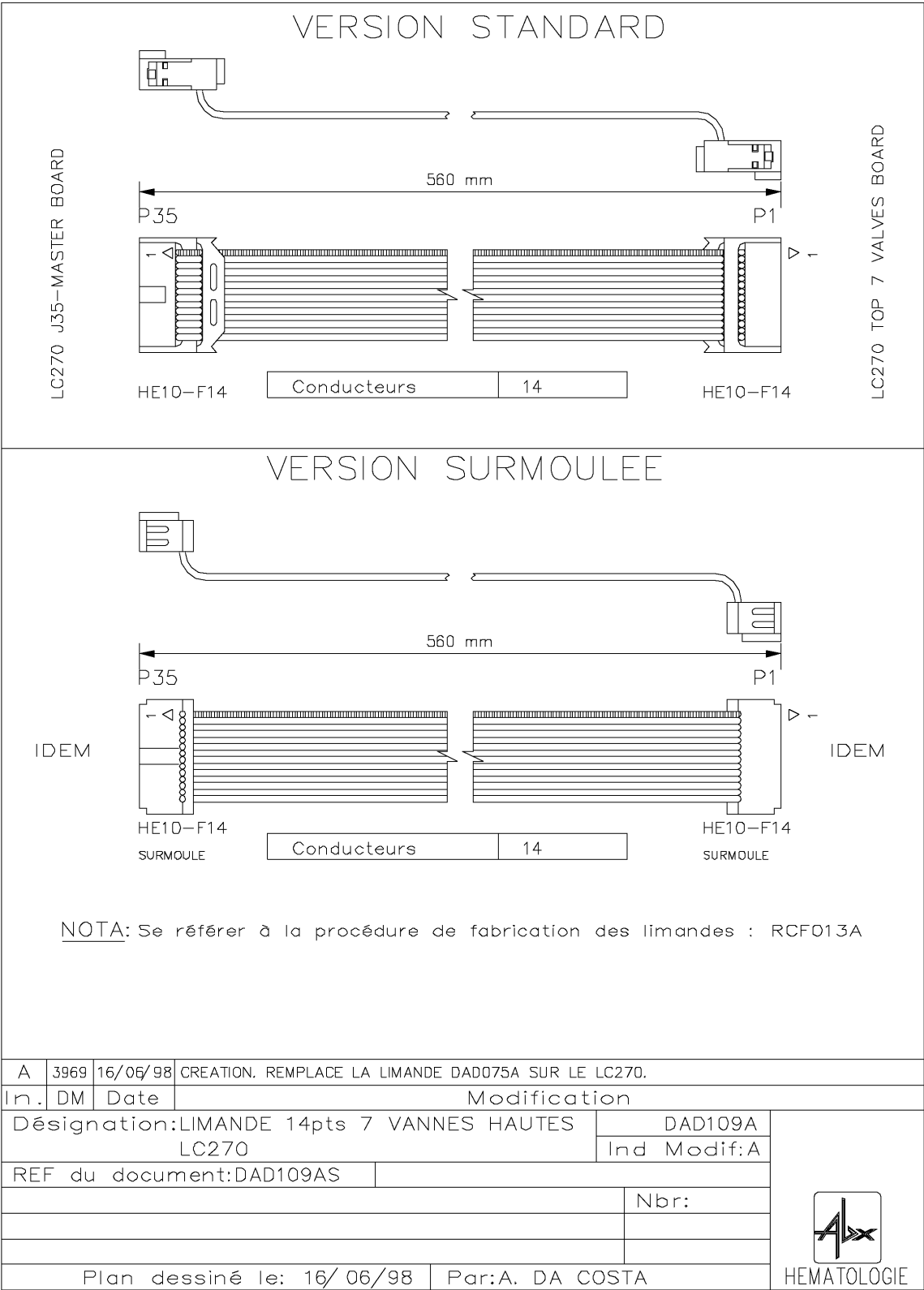
### 3.3. DAD107AS Flat cable 480mm. 14pts



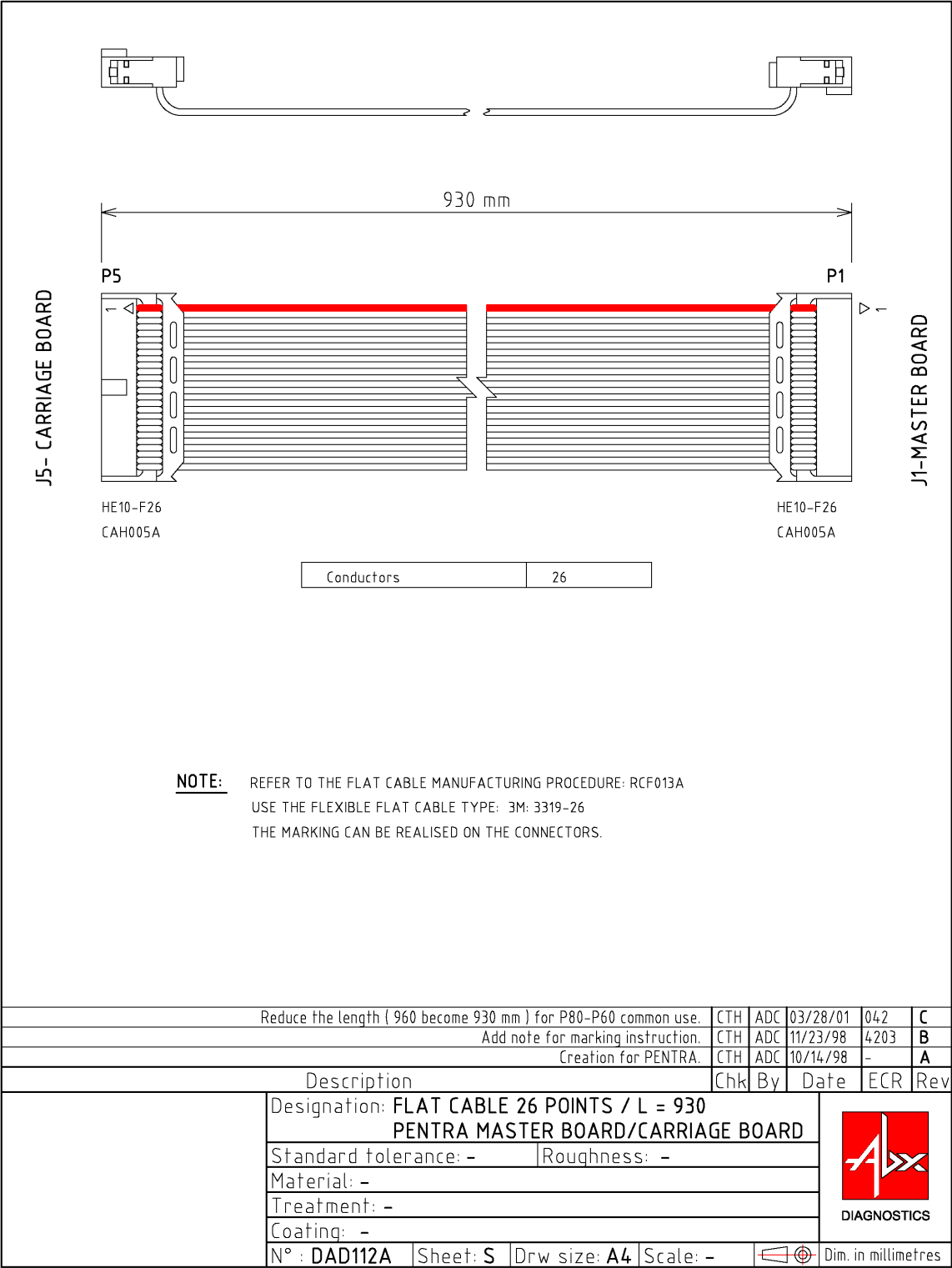
This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.5:DAD075AS Flat cable 480mm. 14pts

3.4. DAD109A Flat cable 560mm. 14pts

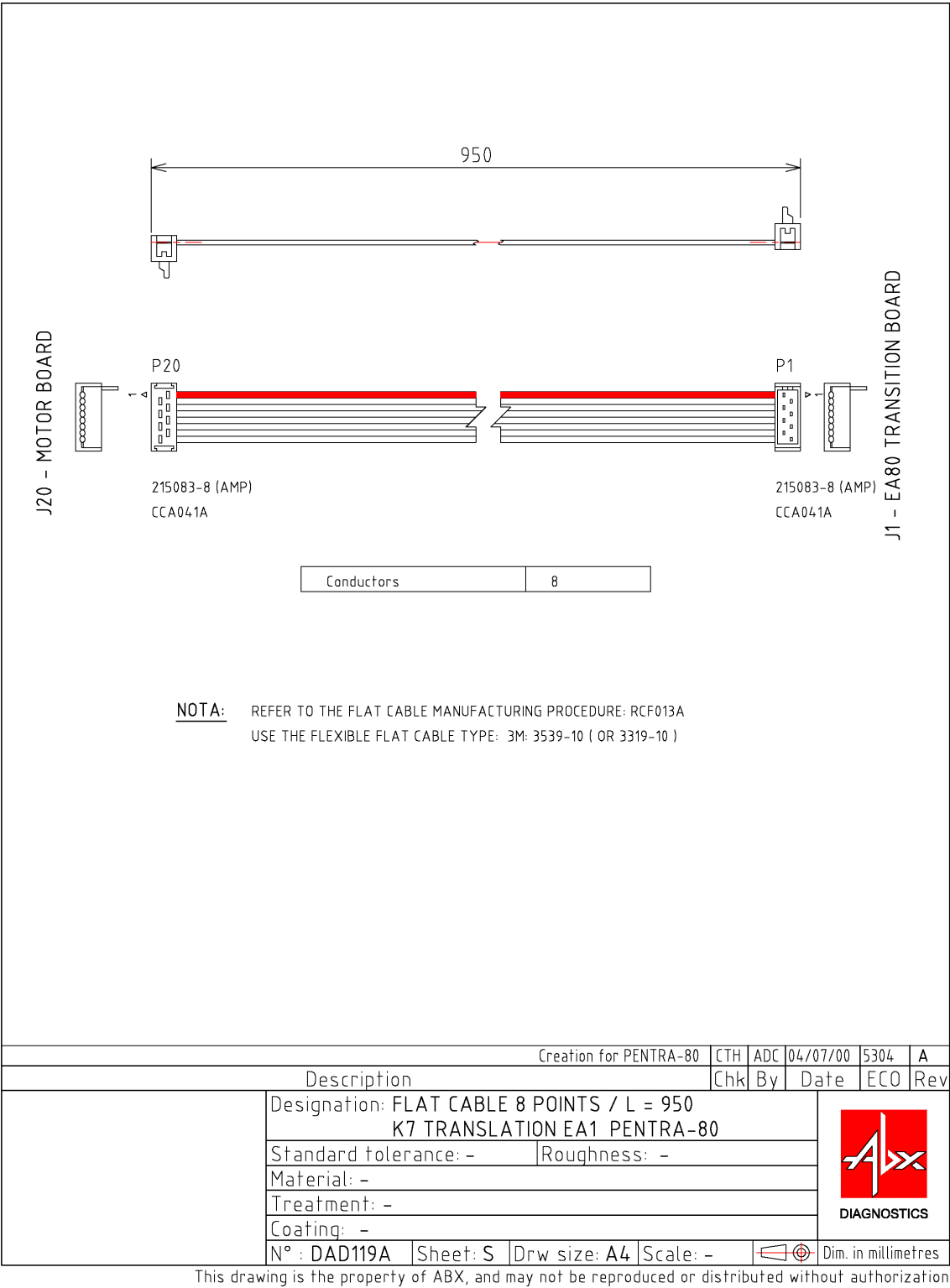


3.5. DAD112AS Flat cable 930mm. 26pts (Main board\Carriage board)



Diag.7:DAD112AS Flat cable 930mm. 26pts

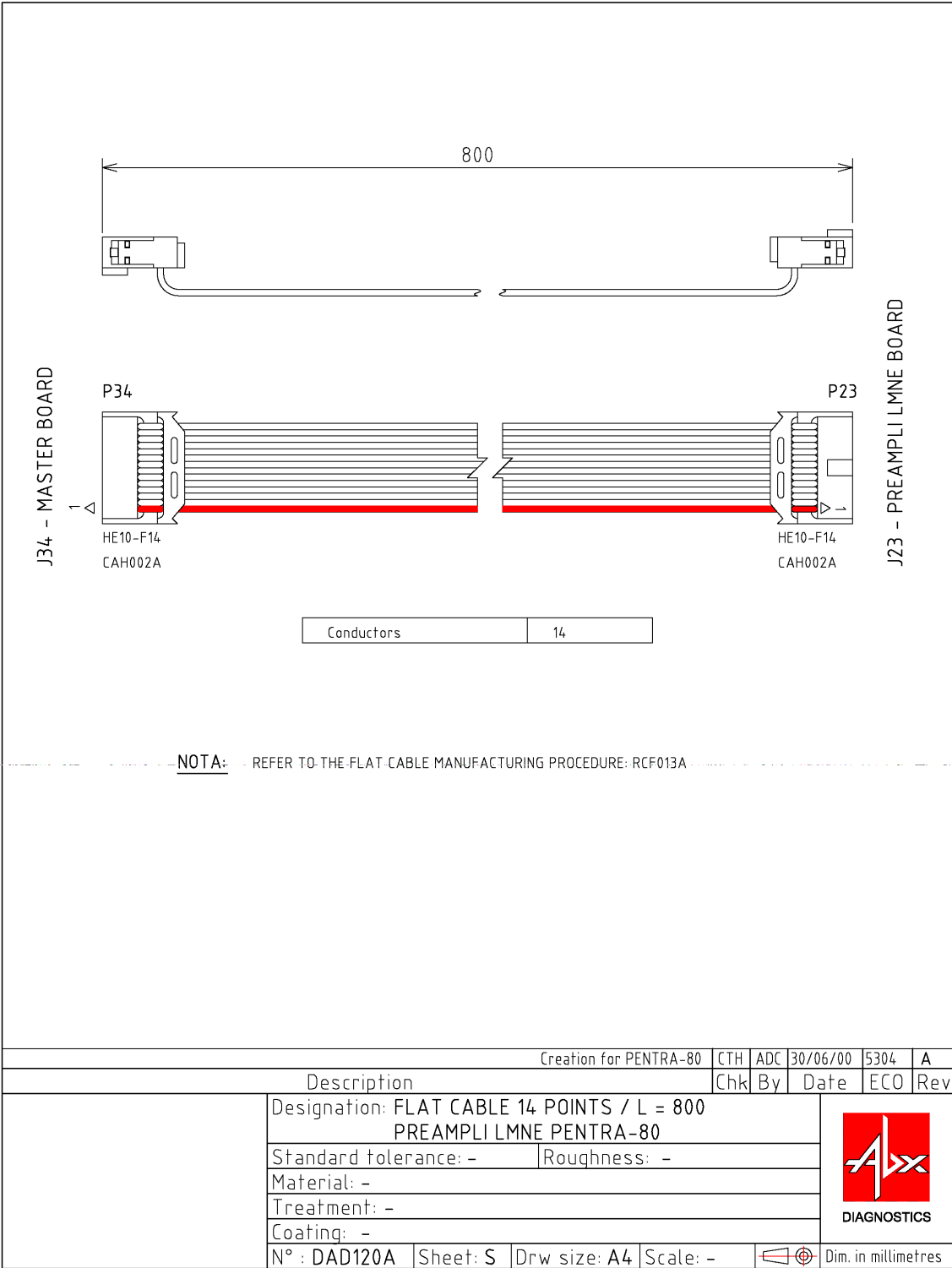
3.6. DAD119AS Flat cable 950mm. 8pts



Diag.8:DAD119AS Flat cable 950mm. 8pts

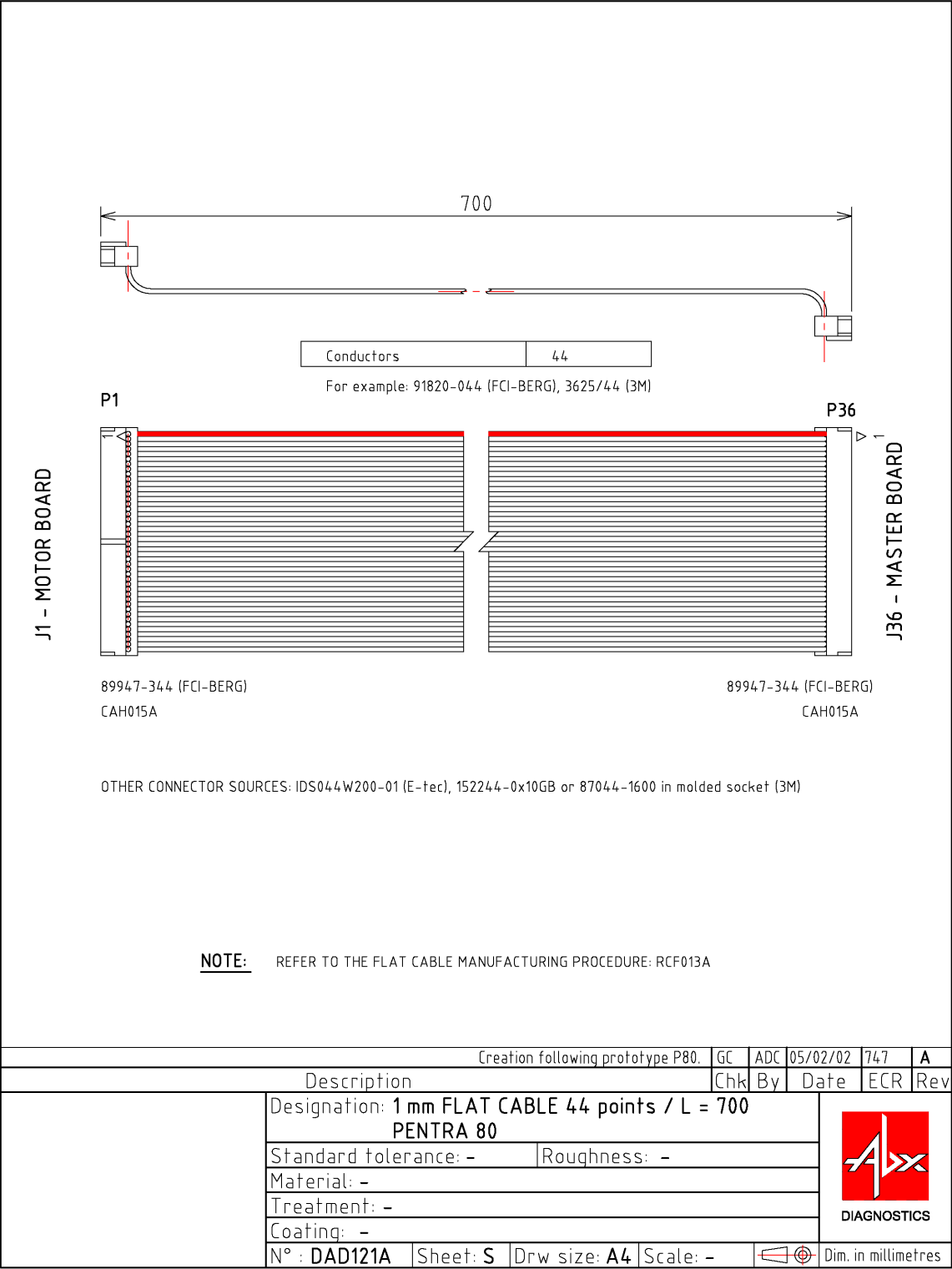


3.7. DAD120A Flat cable 800mm. 14pts



Diag.9:DAD120A Flat cable 800mm. 14pts

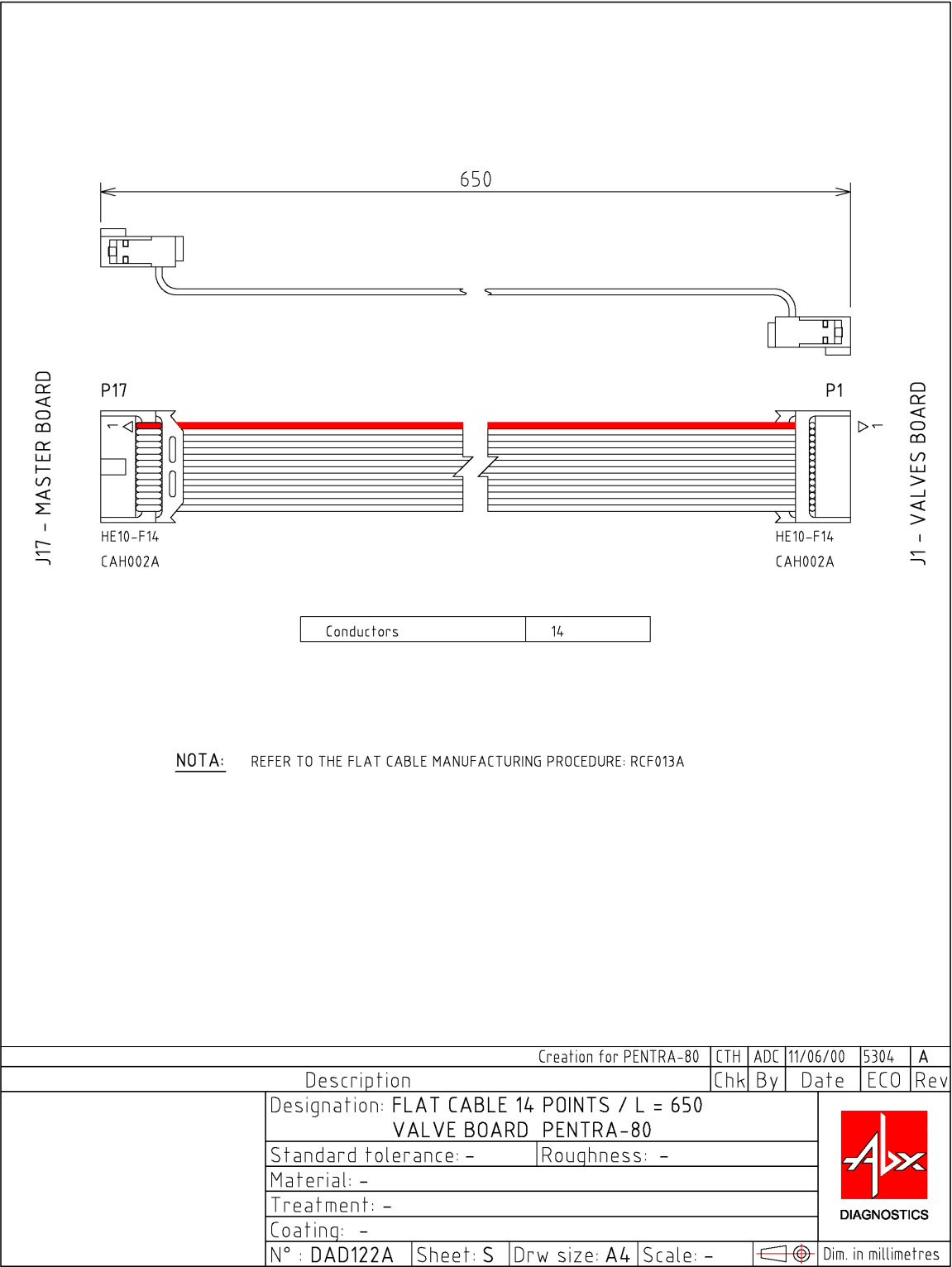
3.8. DAD121A Flat cable 700mm. 44pts



This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.10:DAD121A Flat cable 700mm. 44pts

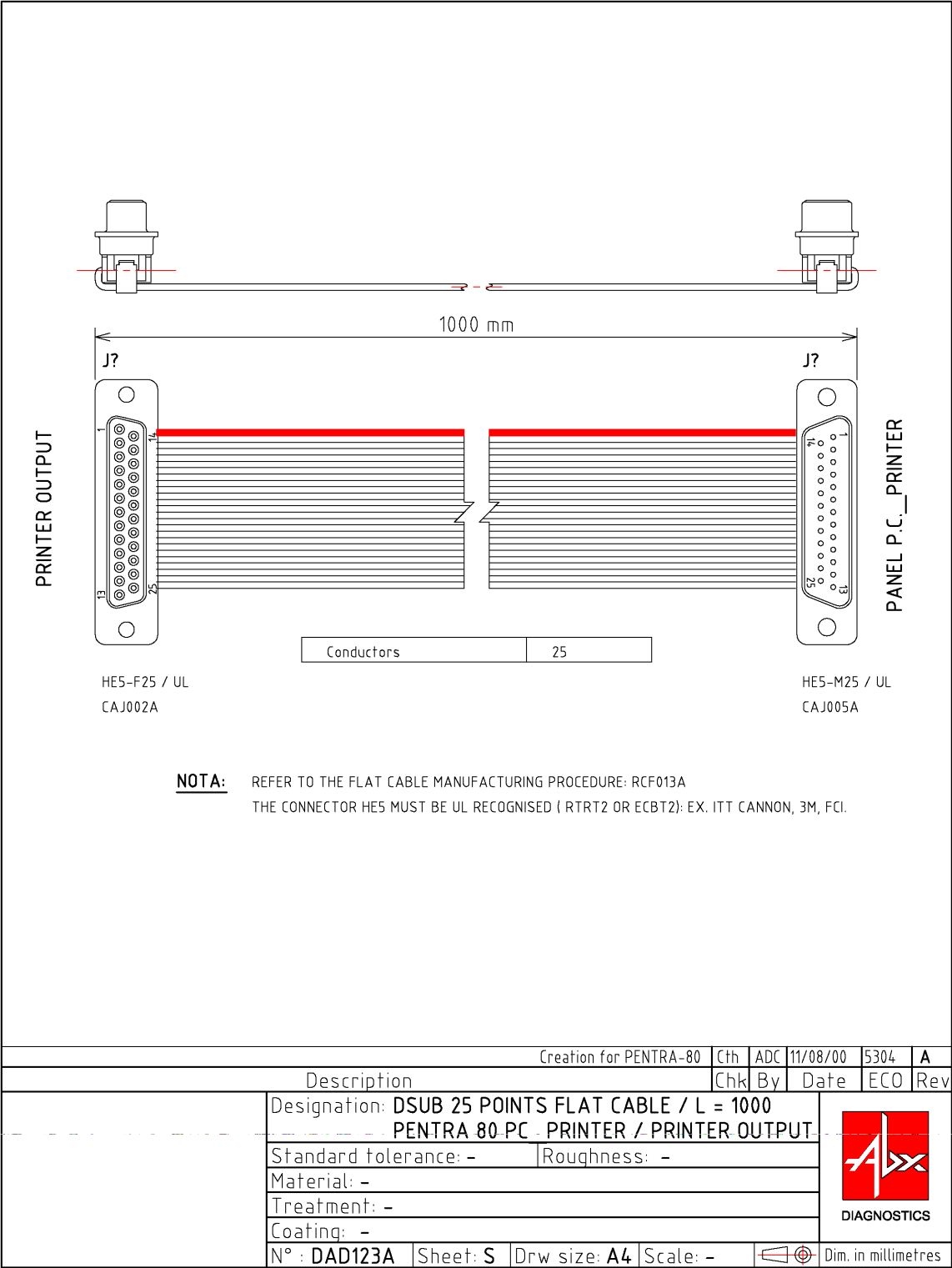
3.9. DAD122A Flat cable 650mm. 14pts



This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.11:DAD122A Flat cable 650mm. 14pts

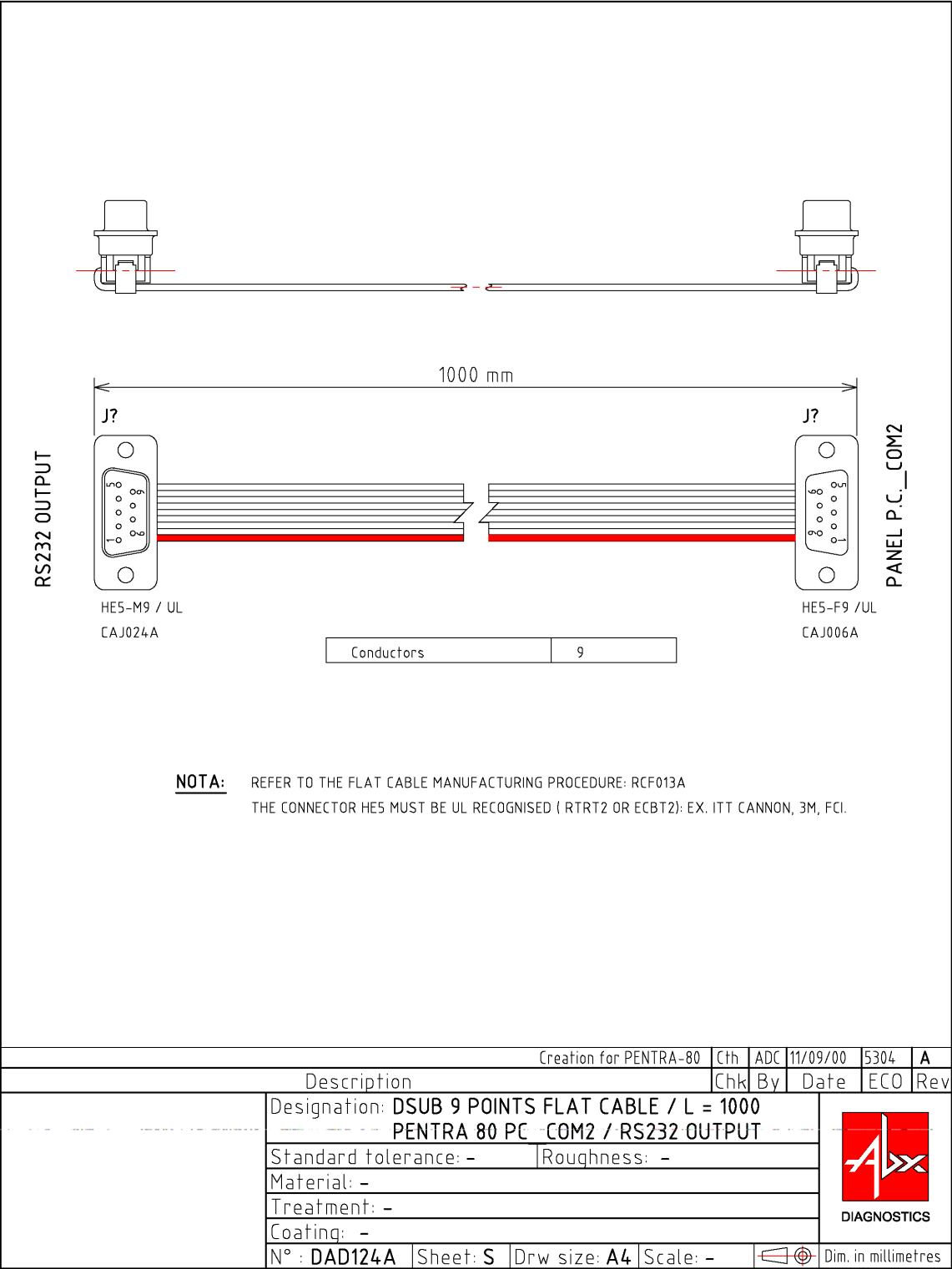
3.10. DAD123A DSUB 25pts Flat cable 1000mm.



This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.12:DAD123A DSUB 25pts Flat cable 1000mm.

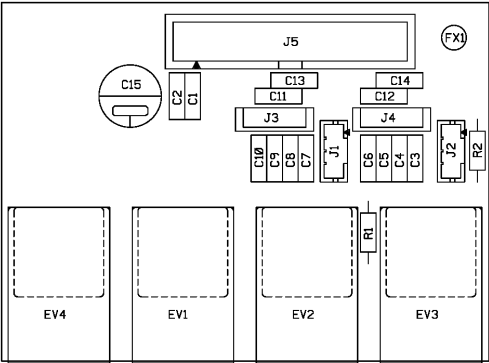
3.11. DAD124A DSUB 9pts Flat cable 1000mm.



This drawing is the property of ABX, and may not be reproduced or distributed without authorization

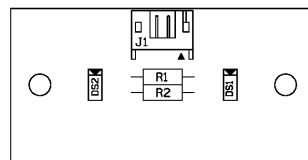
Diag.13:DAD124A DSUB 9pts Flat cable 1000mm.

3.12. XAA428C Carriage board

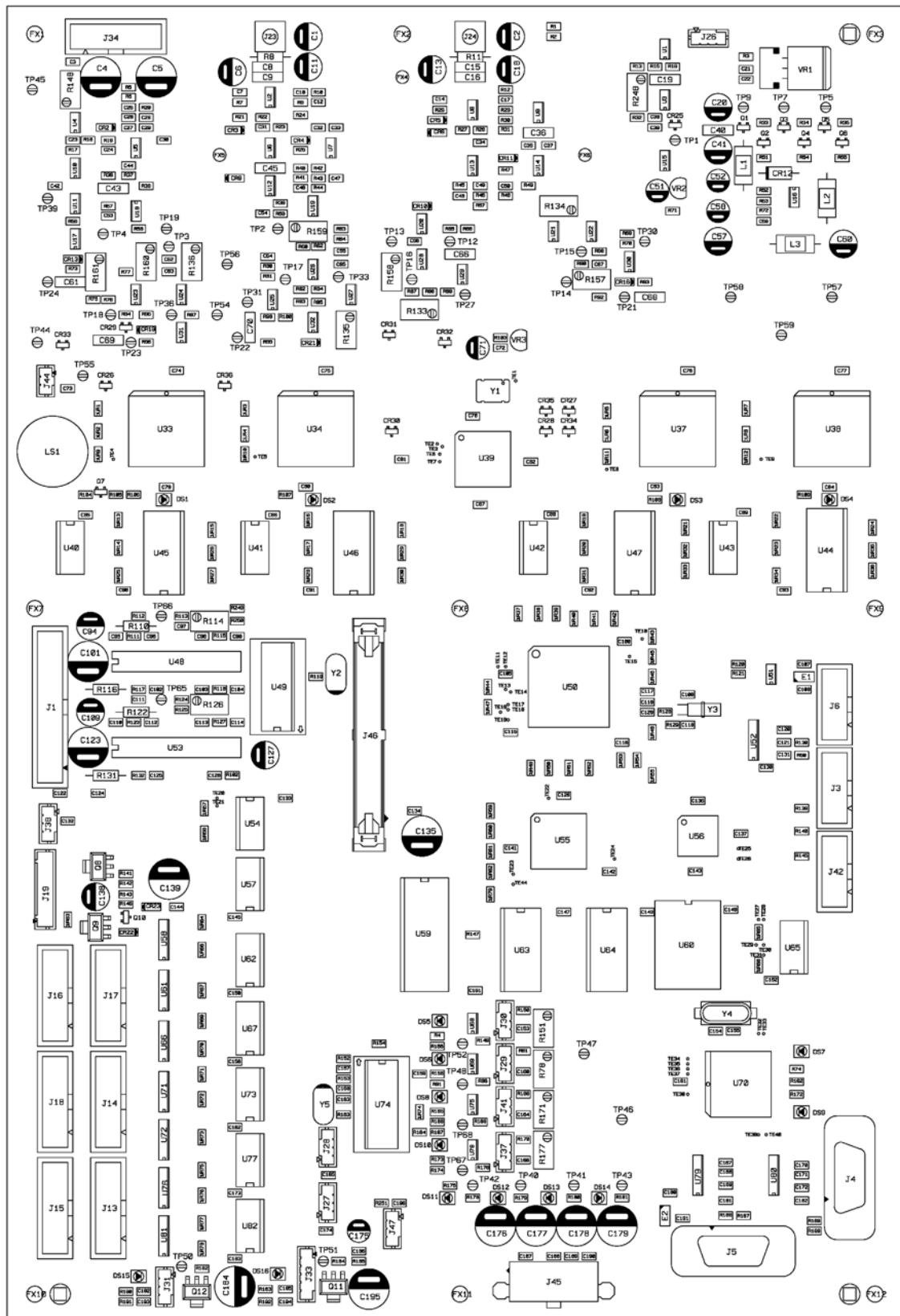


Diag. 14:XAA428C Carriage board

## 3.13. XAA429A LEDs board

*Diag.15:XAA429A LEDs board*

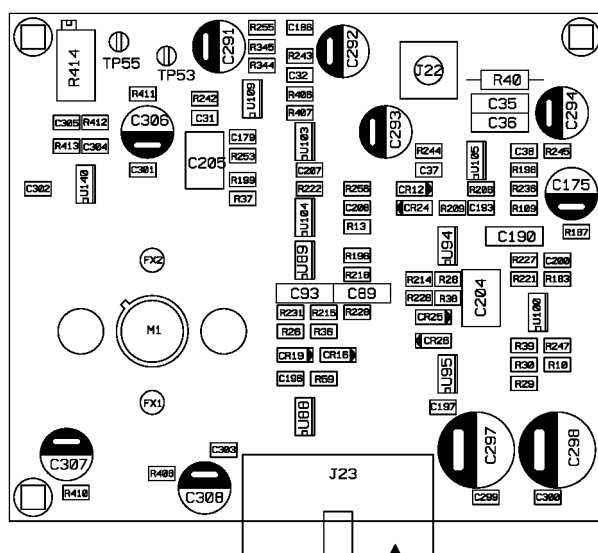
## 3.14. XAA456A Main board



Diag.16:XAA456A Main board

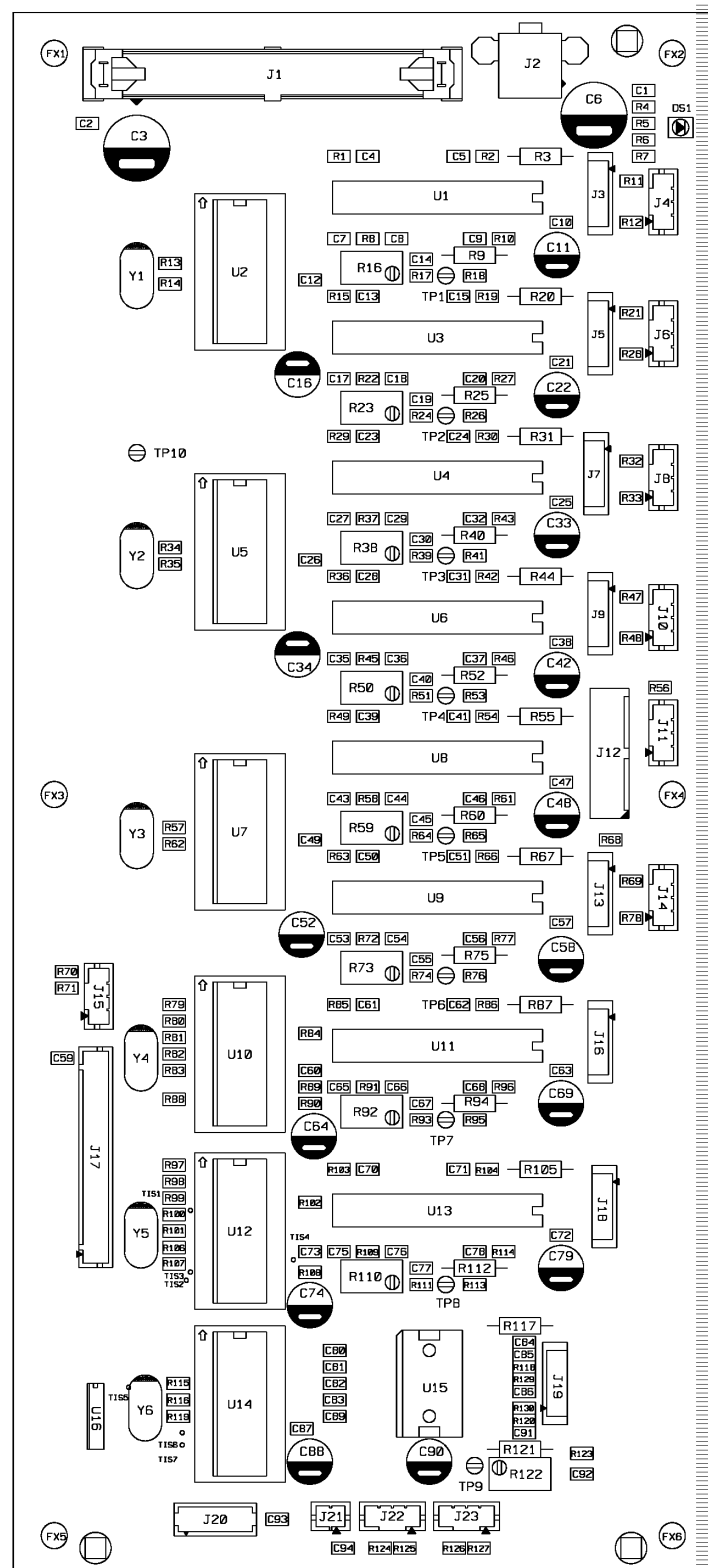


### 3.15. XAA458A LMNE amplifier board



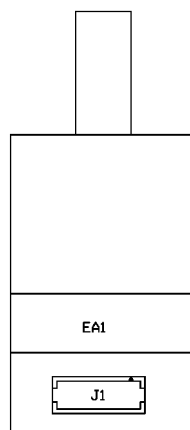
Diag.17:XAA458A LMNE amplifier board

### 3.16. XAA459A Motor board

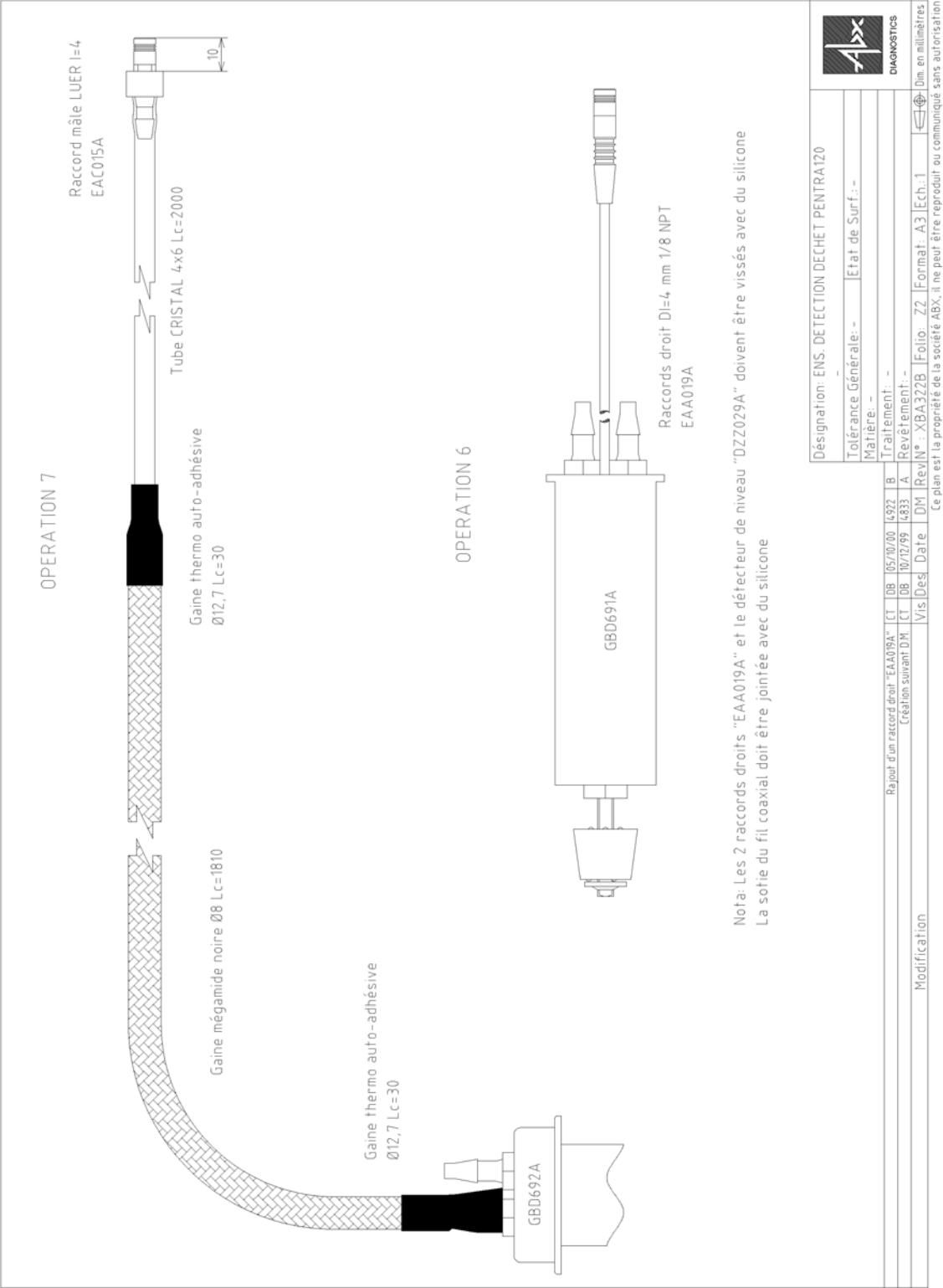


*Diag.18:XAA459A Motor board*

## 3.17. XAA478A Solenoid board

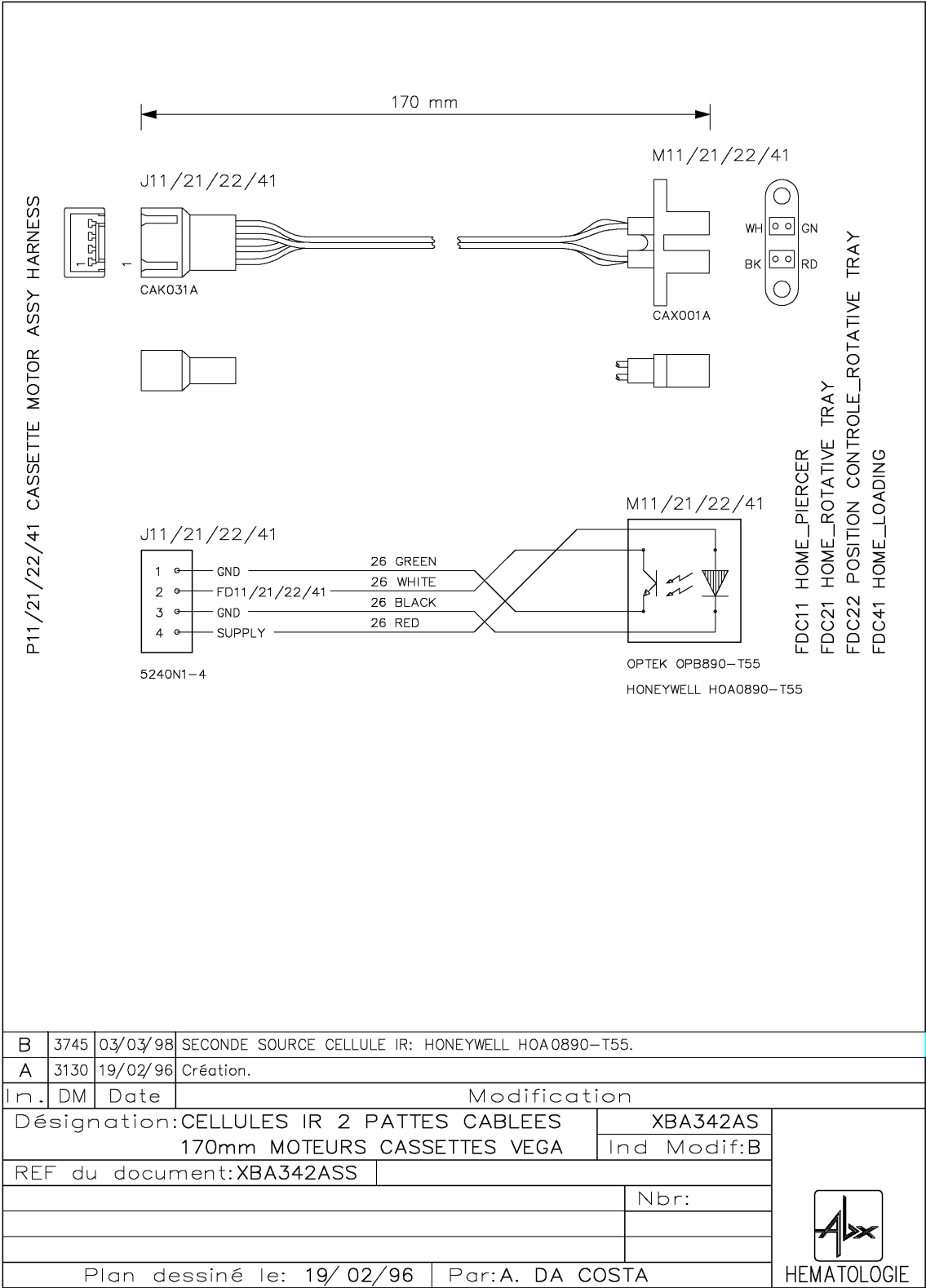
*Diag. 19: XAA478A Solenoid board*

3.18. XBA322B External waste level detection



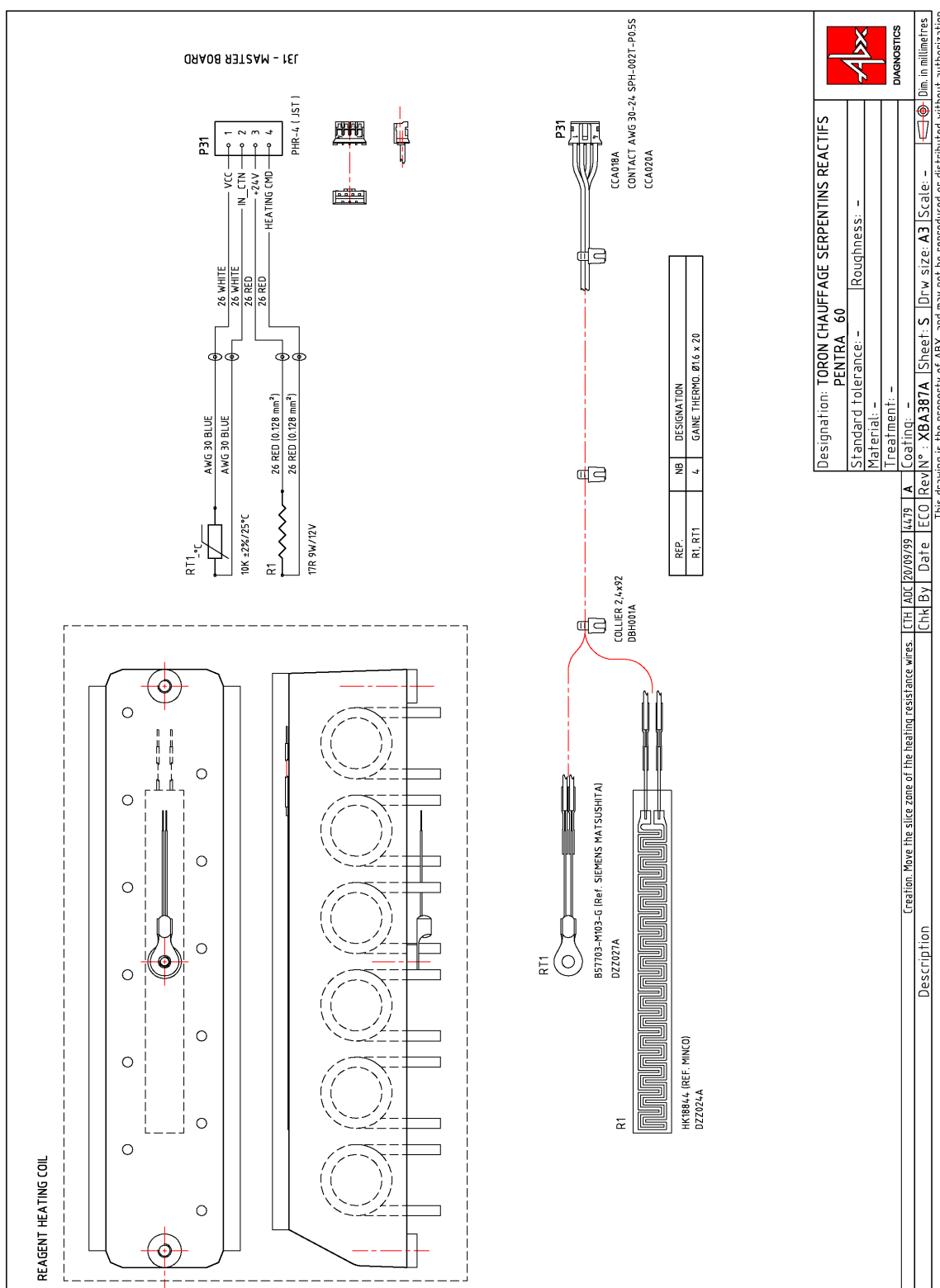
Diag.20:XBA322B External waste level detection

3.19. XBA342A Infrared sensor



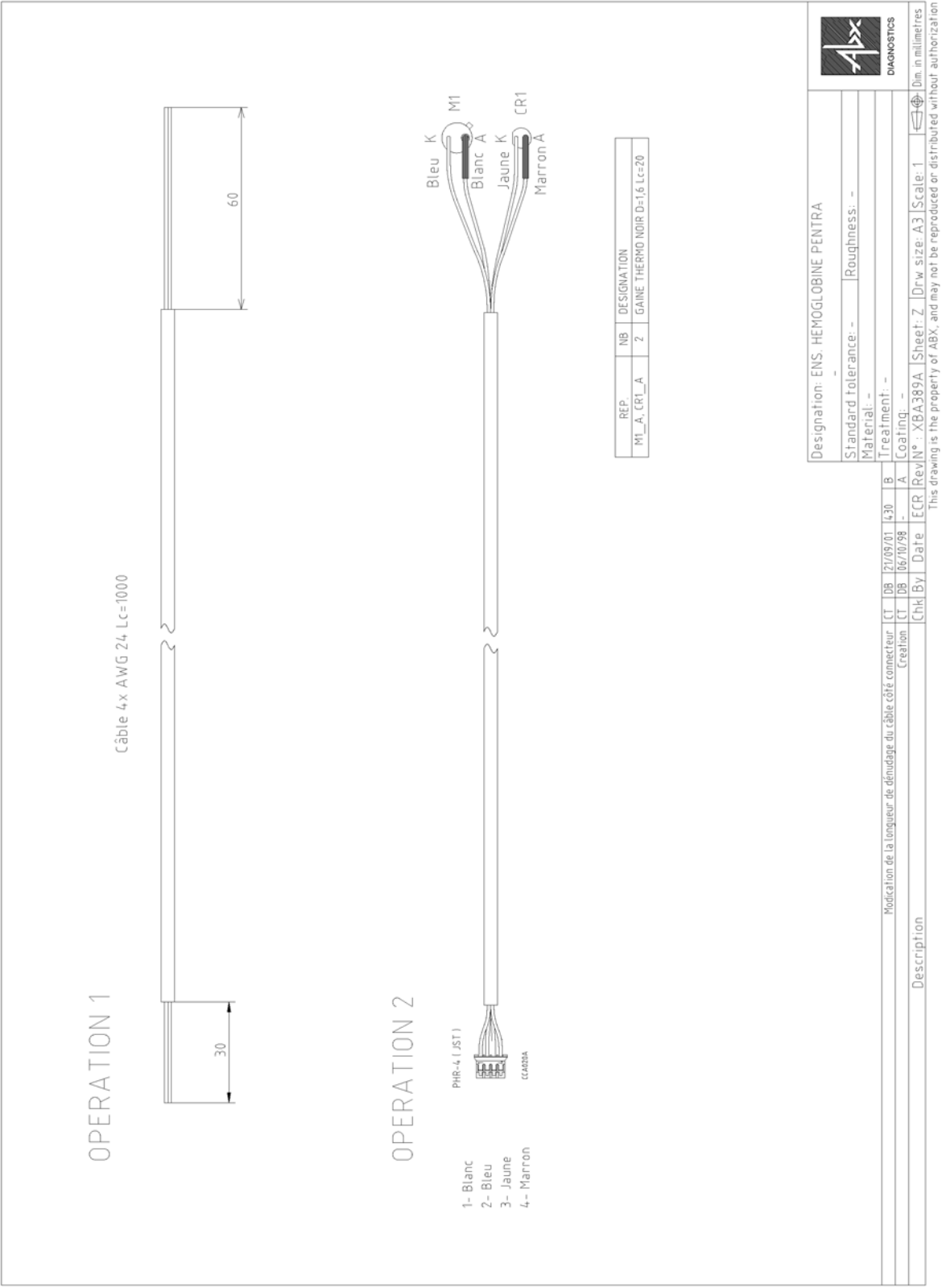
Diag.21:XBA342A Infrared sensor

### 3.20. XBA387A Reagent heating coil



Diag.22:XBA387A Reagent heating coil

3.21. XBA389A Hemoglobin photometer

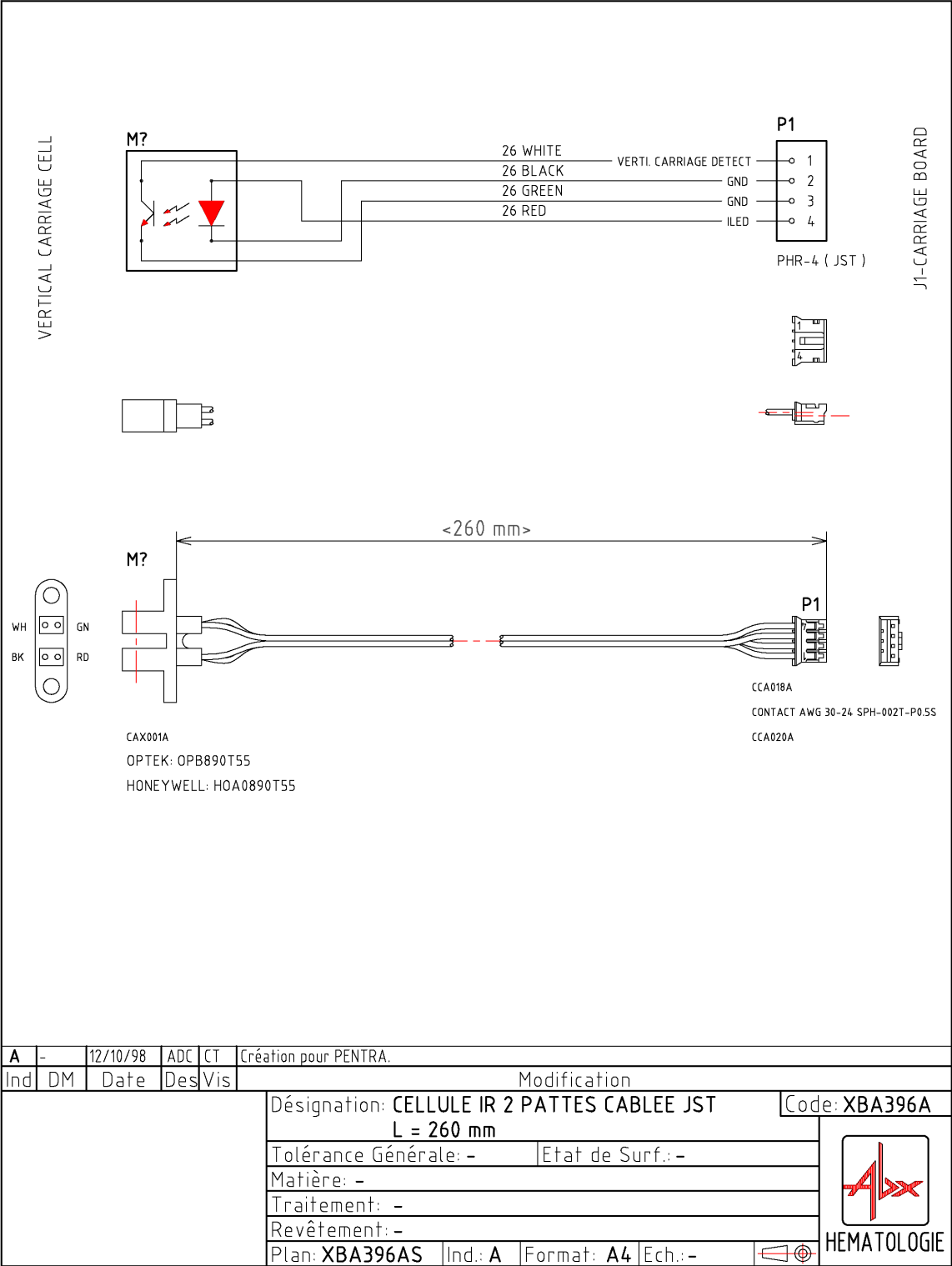


Diag.23:XBA389A Hemoglobin photometer





3.23. XBA396A Infrared 260mm.

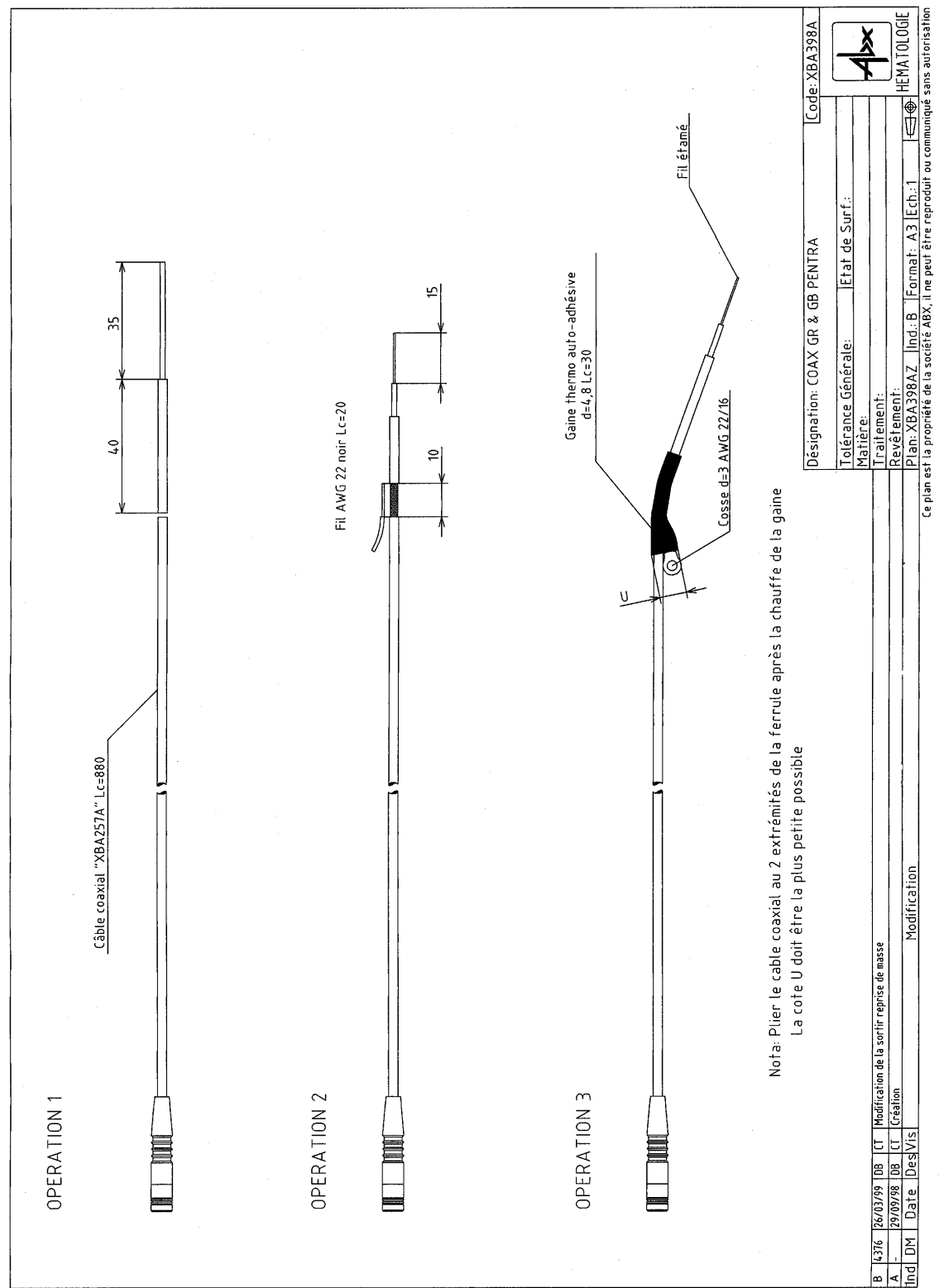


A	-	12/10/98	ADC	CT	Création pour PENTRA.
Ind	DM	Date	Des	Vis	Modification
Désignation: CELLULE IR 2 PATTES CABLEE JST					Code: XBA396A
L = 260 mm					
Tolérance Générale: -					Etat de Surf.: -
Matière: -					
Traitement: -					
Revêtement: -					
Plan: XBA396AS					Ind.: A
					Format: A4
					Ech.: -

Ce plan est la propriété de la société ABX, il ne peut être reproduit ou communiqué sans autorisation

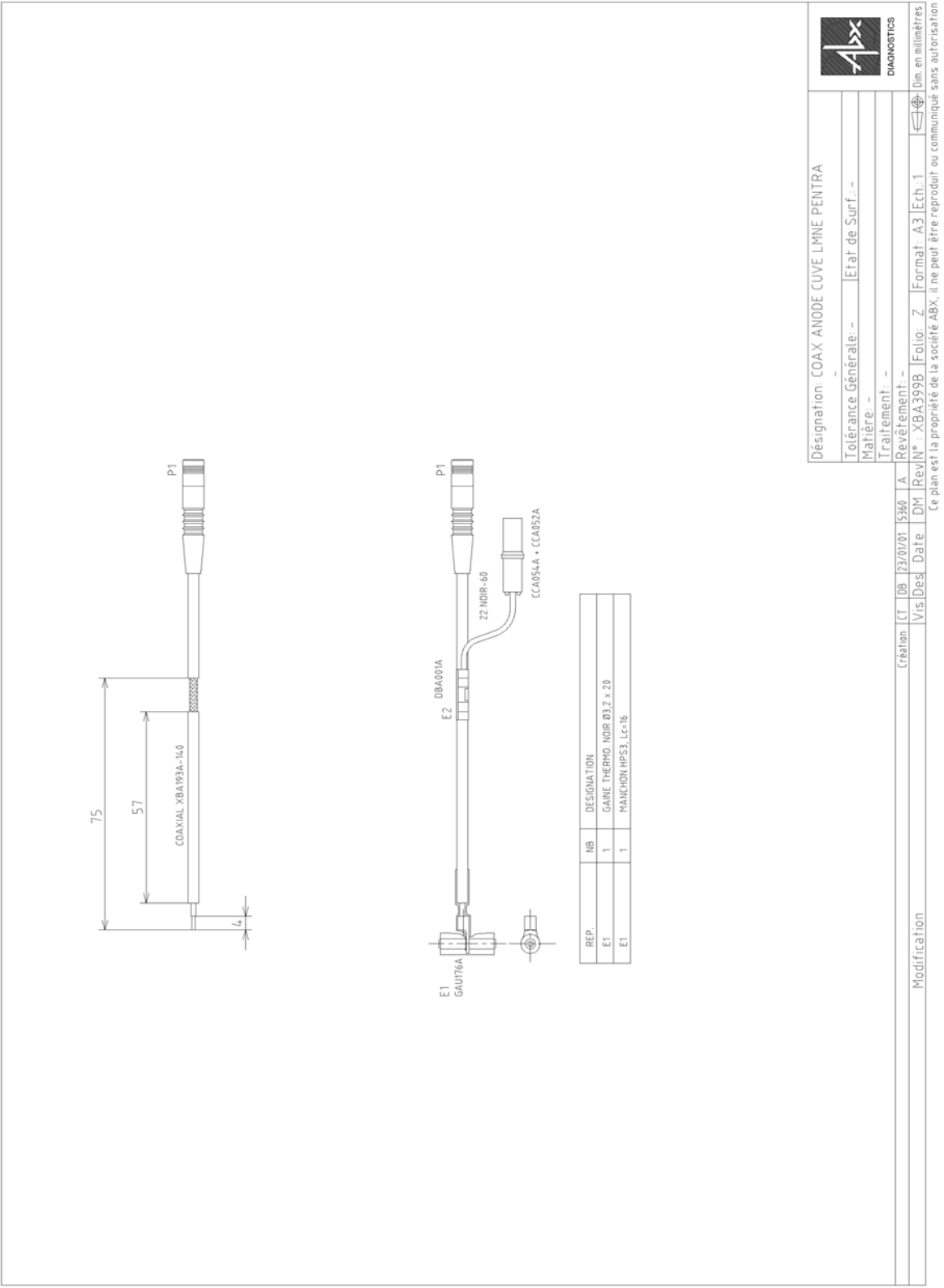
Diag.25:XBA396A Infrared 260mm.

3.24. XBA398B RBC&WBC electrode coaxial cable



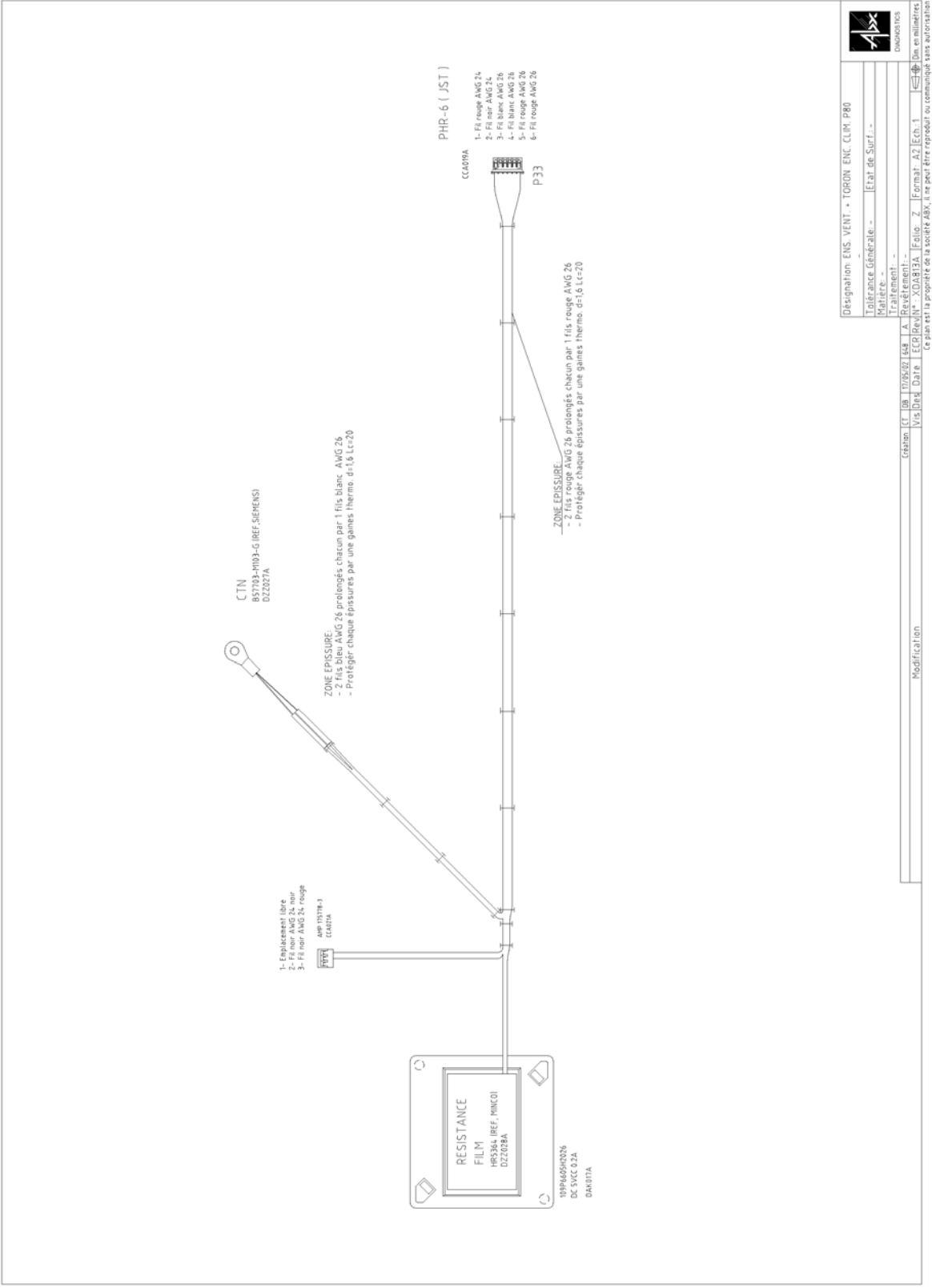
Diag.26:XBA398B RBC&WBC electrode coaxial cable

3.25. XBA399B LMNE flowcell coaxial cable



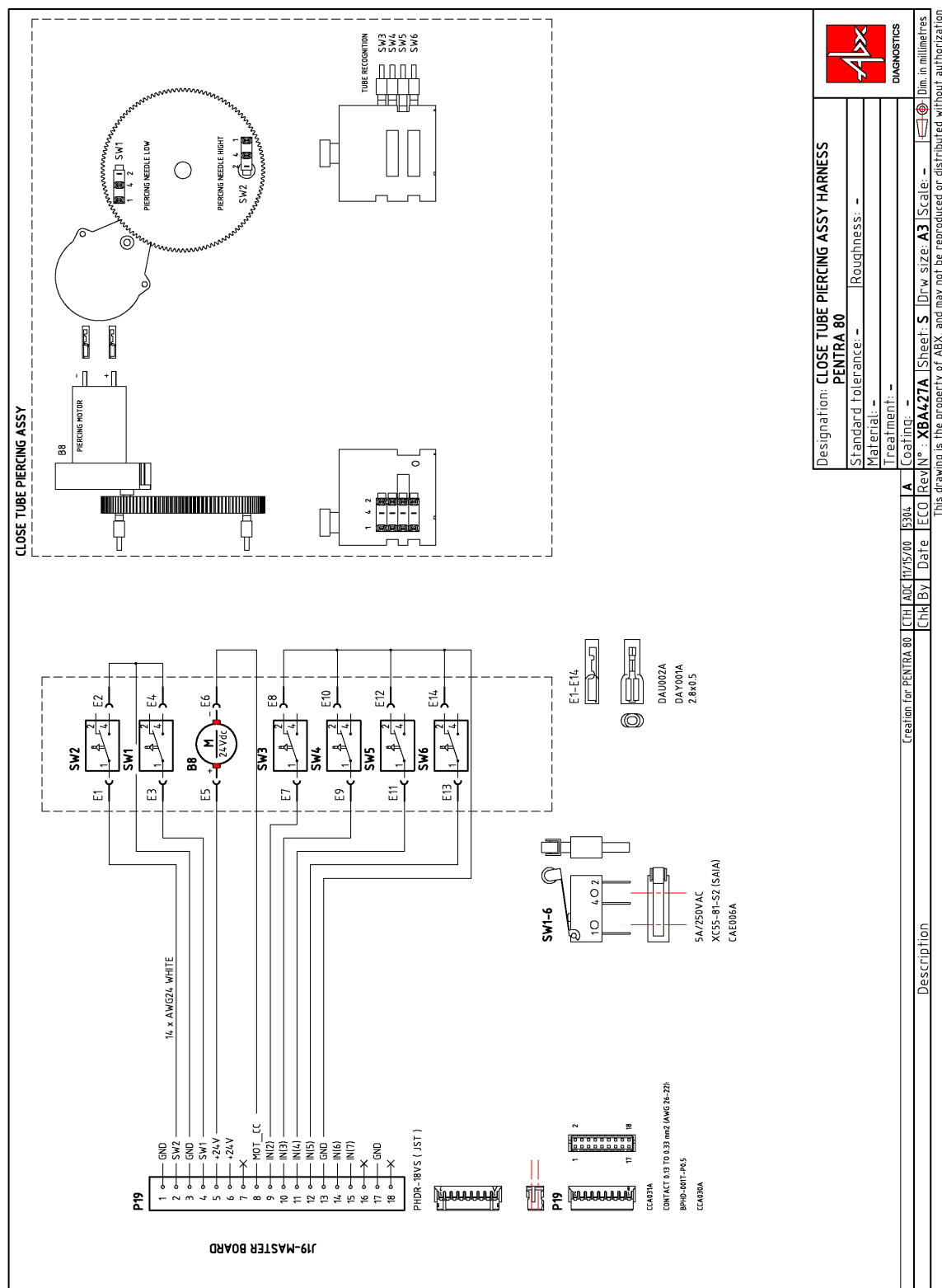
Diag.27:XBA399B LMNE flowcell coaxial cable

3.26. XBA425A Chamber heating



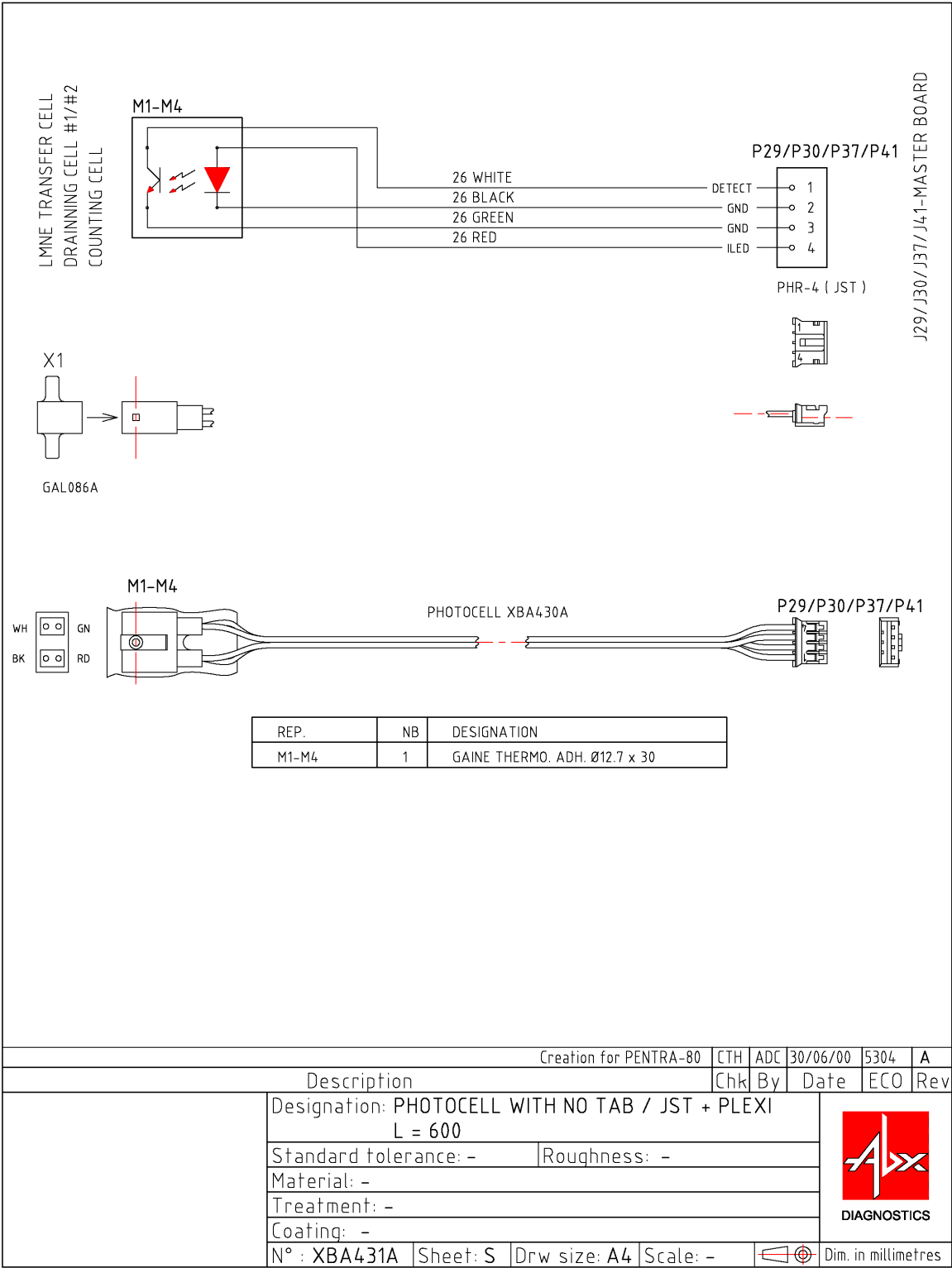
Diag.28:XBA425A Chamber heating

### 3.27. XBA427A Emergency position assy

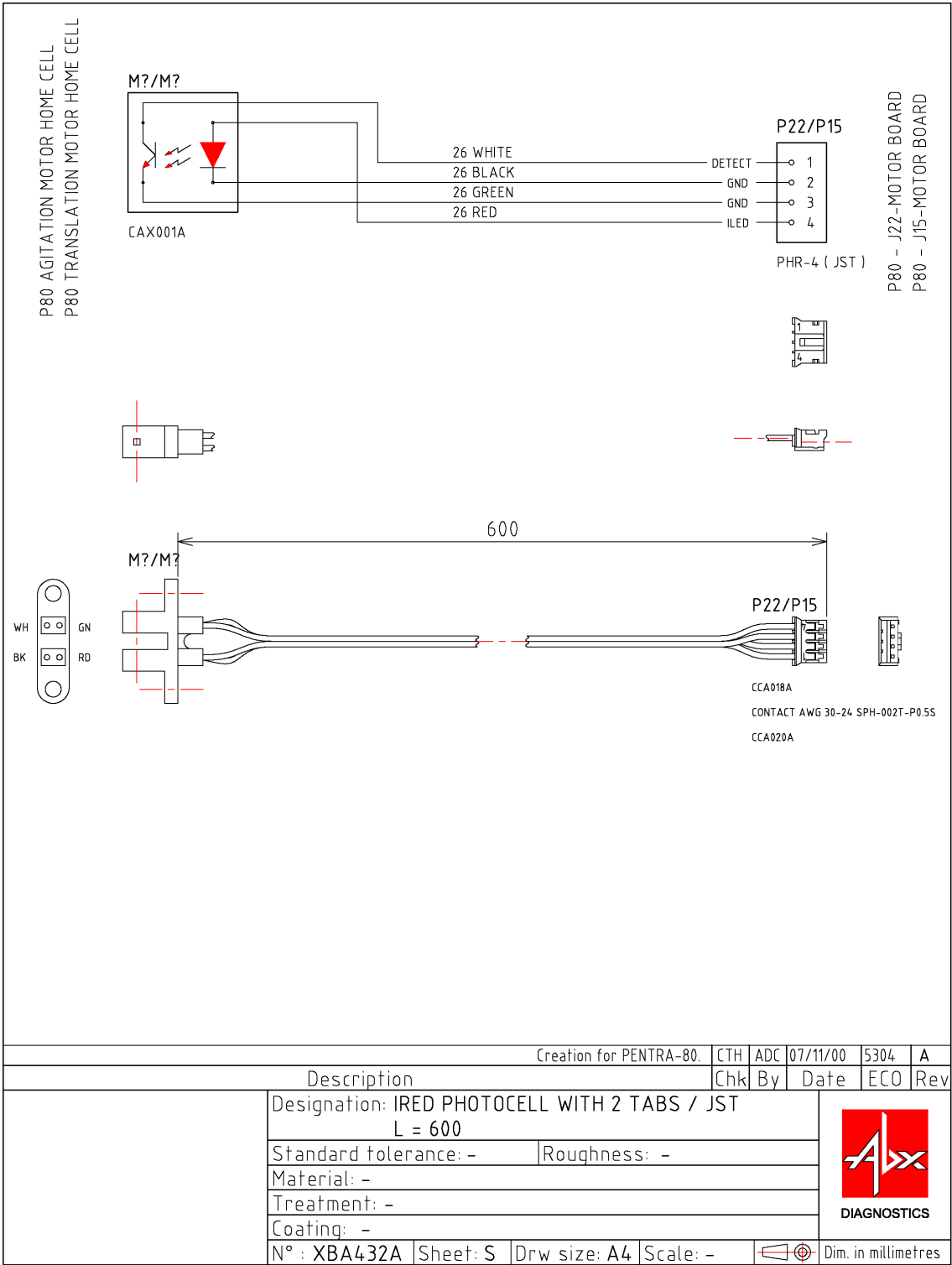


Diag.29:XBA427A Emergency position assy

3.28. XBA431A Infrared photocell 600mm. (No tab)



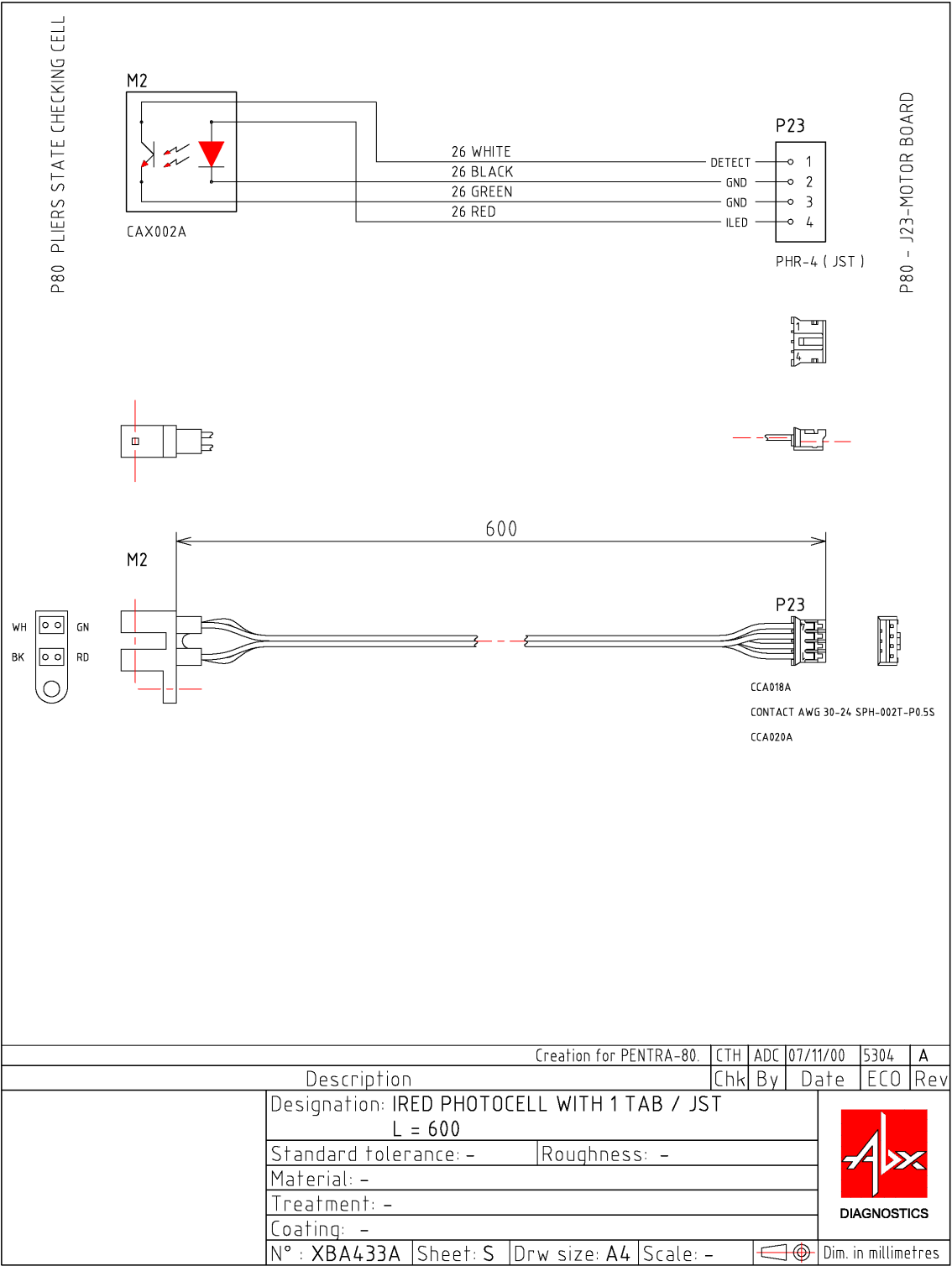
3.29. XBA432A Infrared photocell 600mm. (2 tabs)



This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.31:XBA432A Infrared photocell 600mm. (2 tabs)

3.30. XBA433A Infrared photocell 600mm. (1 tab)

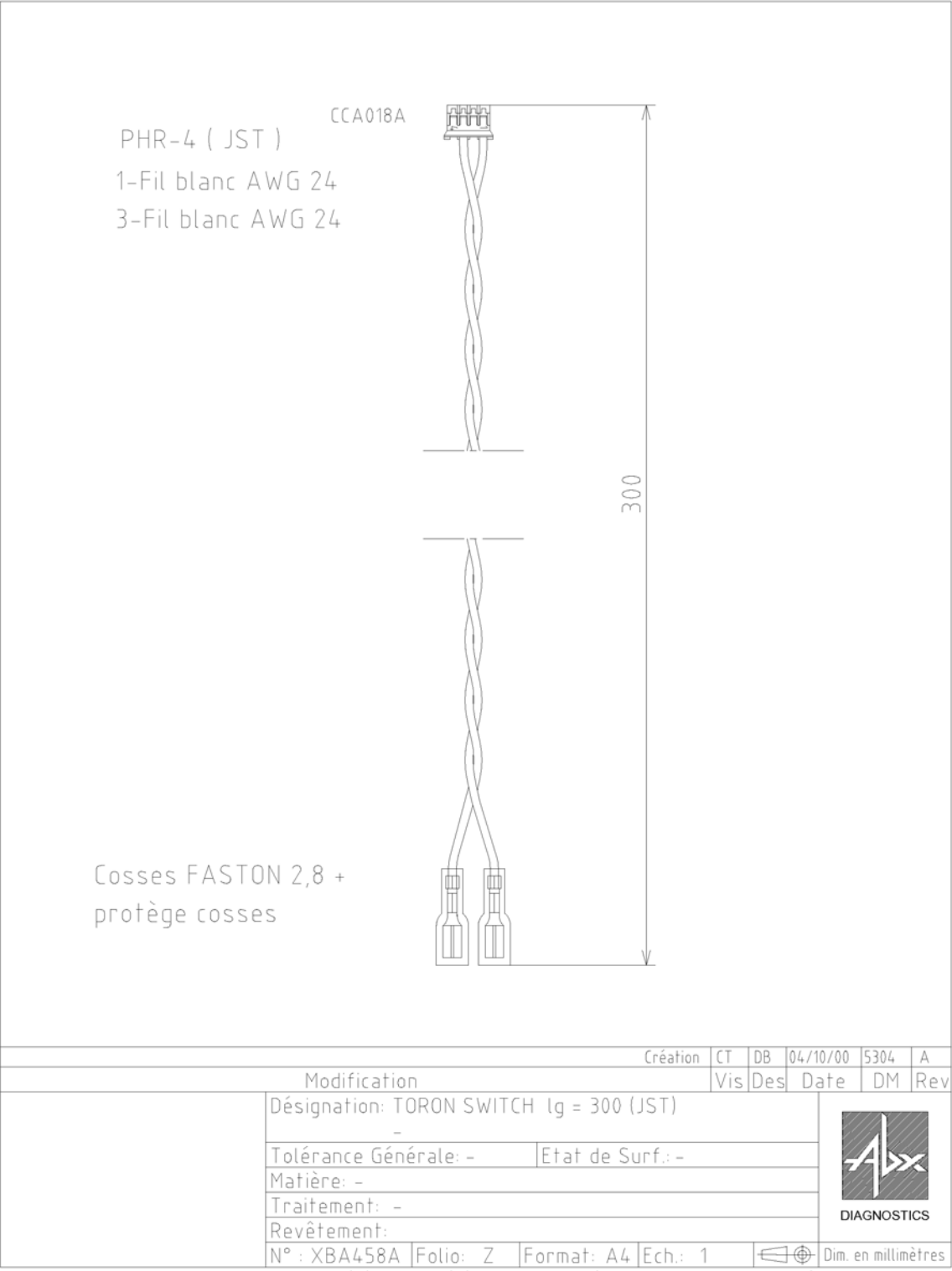


This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.32:XBA433A Infrared photocell 600mm. (1 tab)



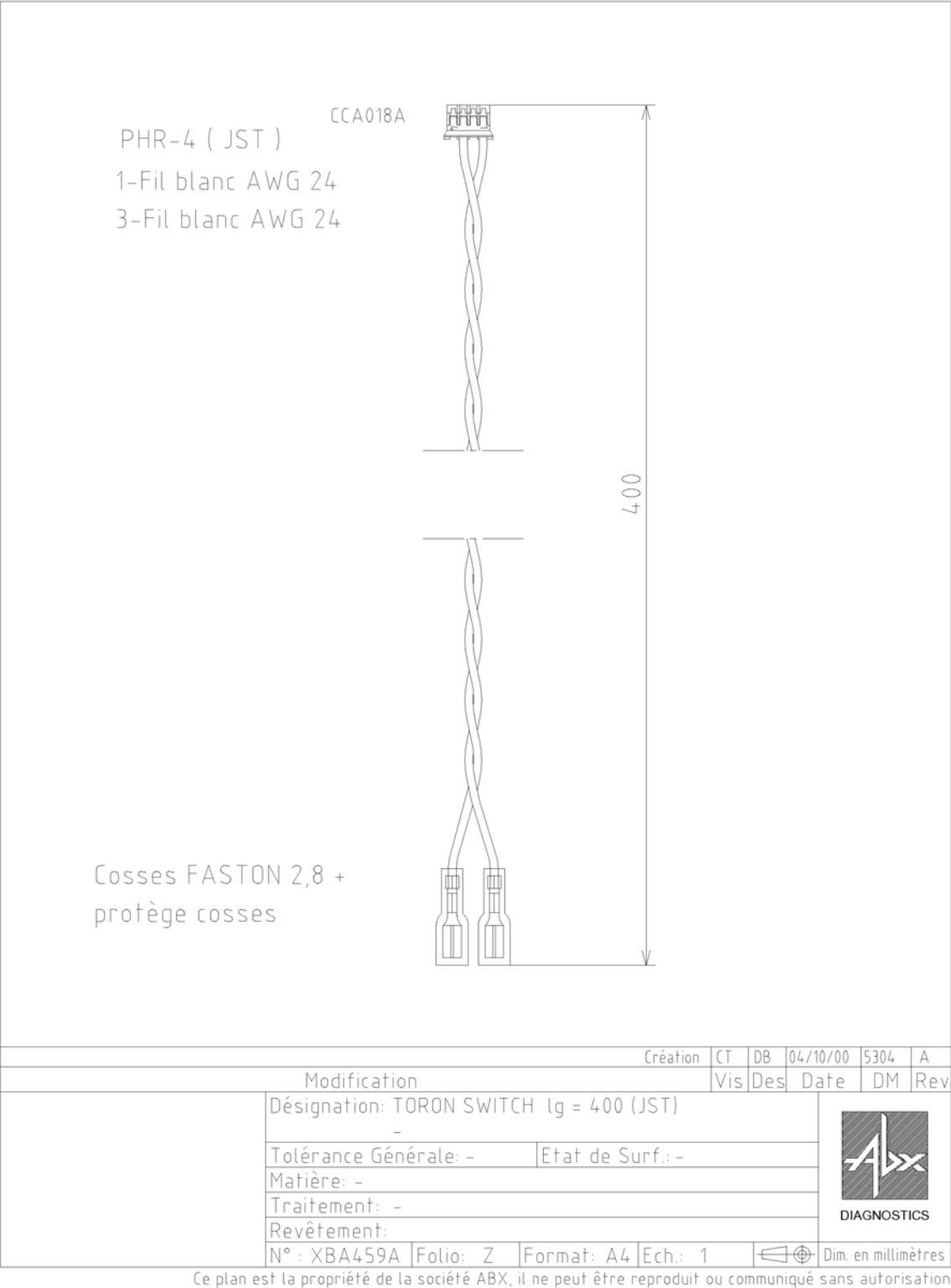
3.31. XBA458A Switch JST 300mm.



Ce plan est la propriété de la société ABX, il ne peut être reproduit ou communiqué sans autorisation

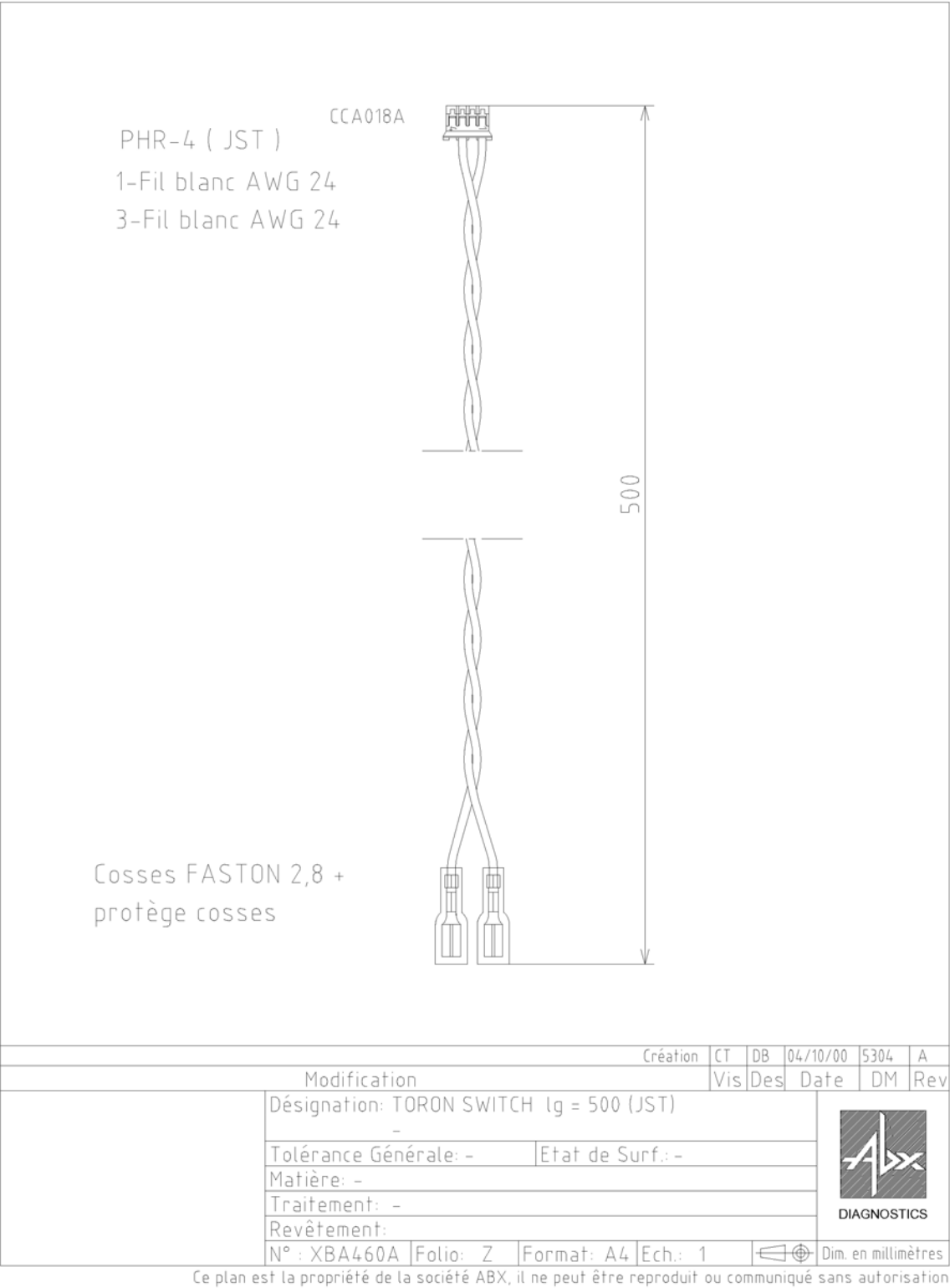
Diag.33:XBA458A Switch JST 300mm.

3.32. XBA459A Switch JST 400mm.



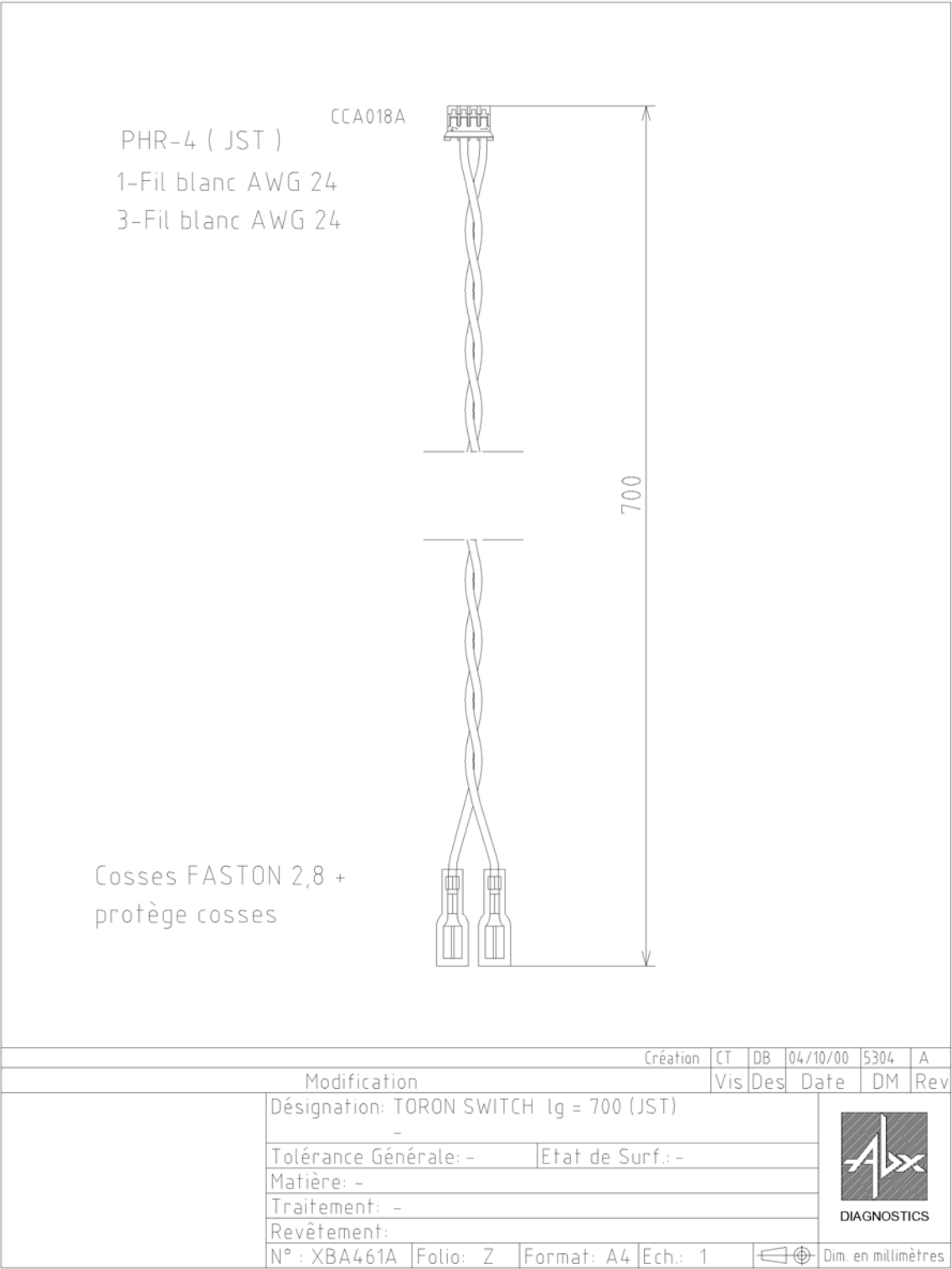
Diag.34:XBA459A Switch JST 400mm.

3.33. XBA460A Switch Jst 500mm.



Diag.35:XBA460A Switch Jst 500mm.

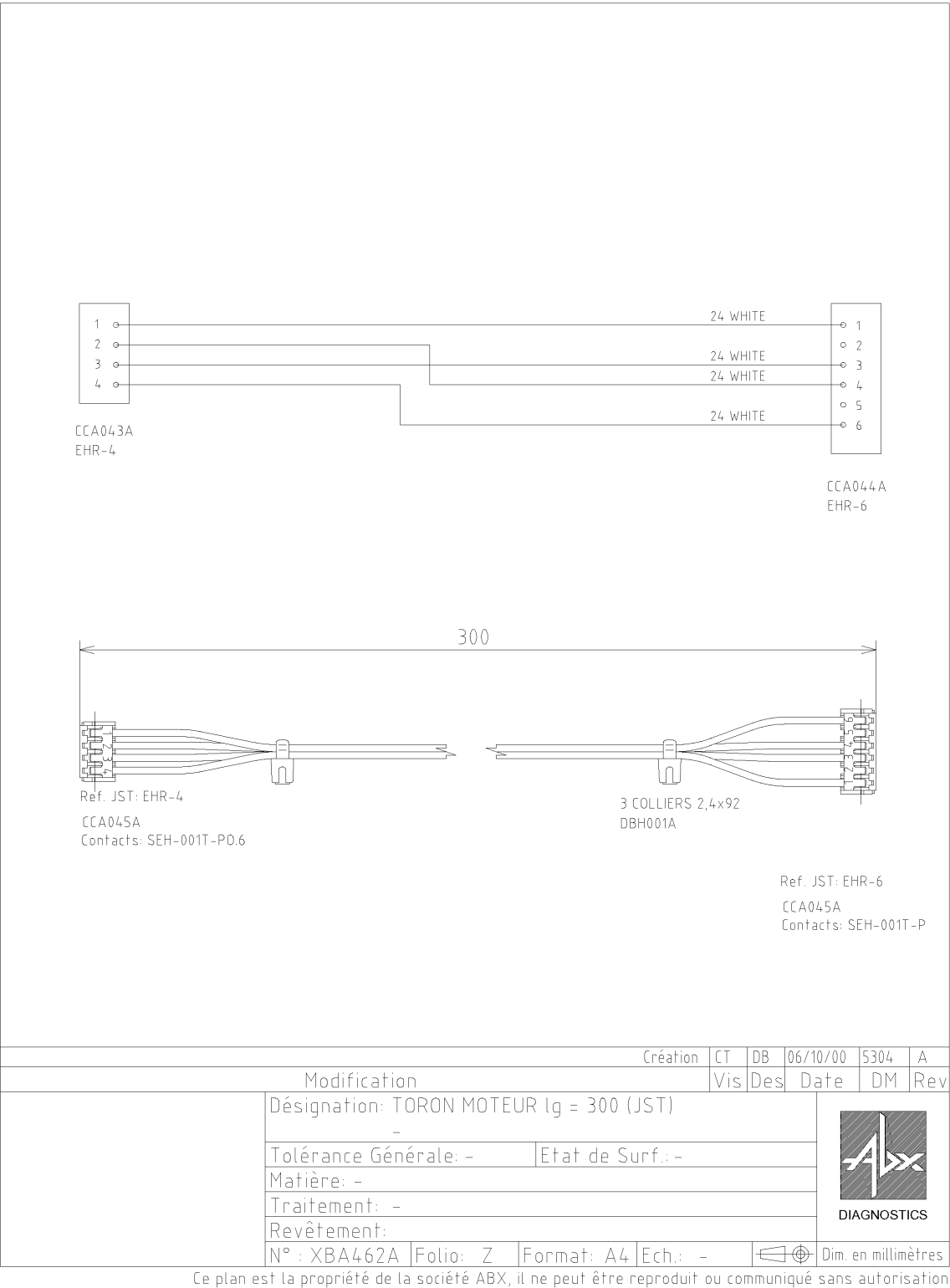
3.34. XBA461A Switch Jst 700mm.



Ce plan est la propriété de la société ABX, il ne peut être reproduit ou communiqué sans autorisation

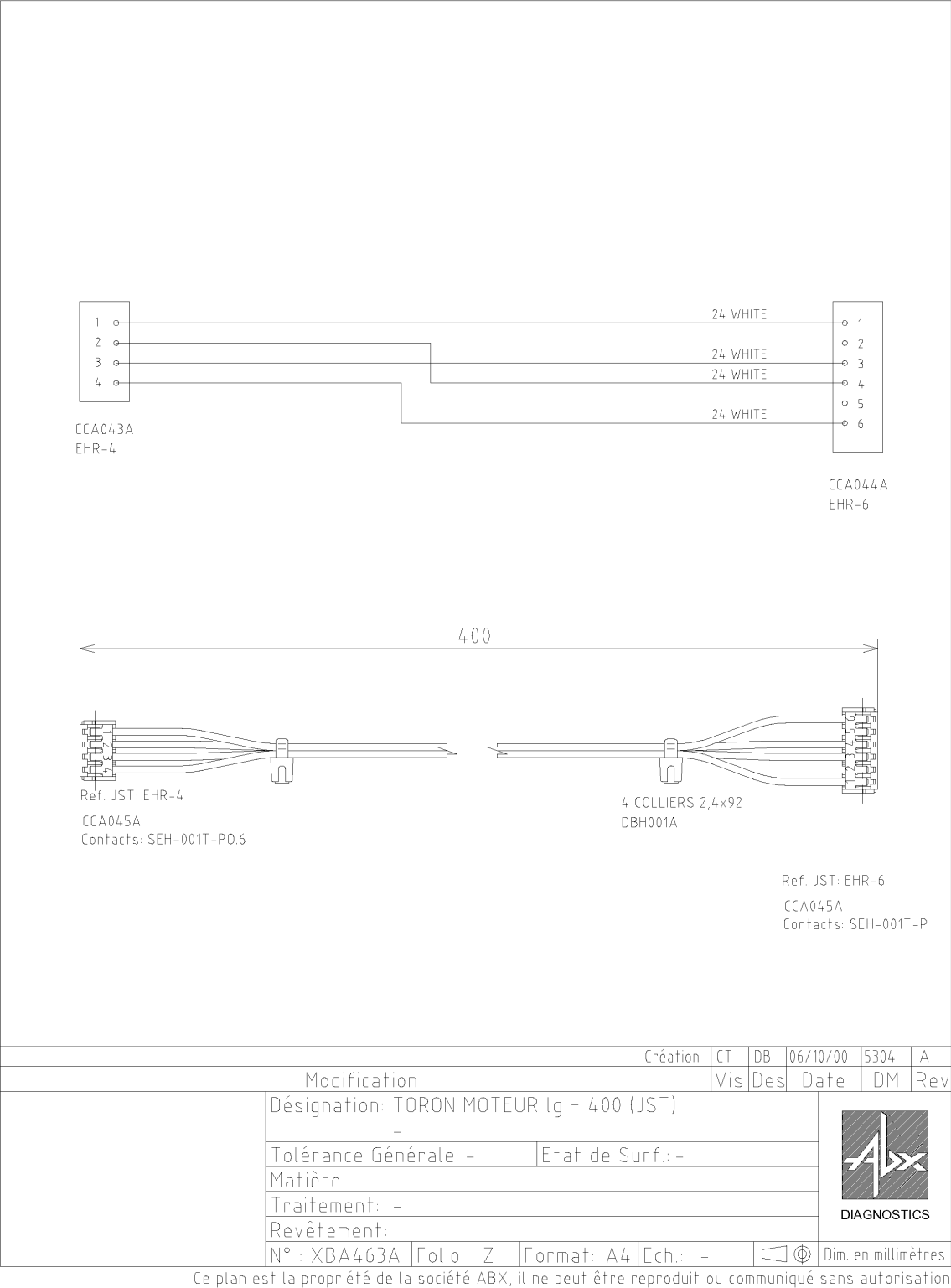
Diag.36:XBA461A Switch Jst 700mm.

3.35. XBA462A Motor Jst 300mm.



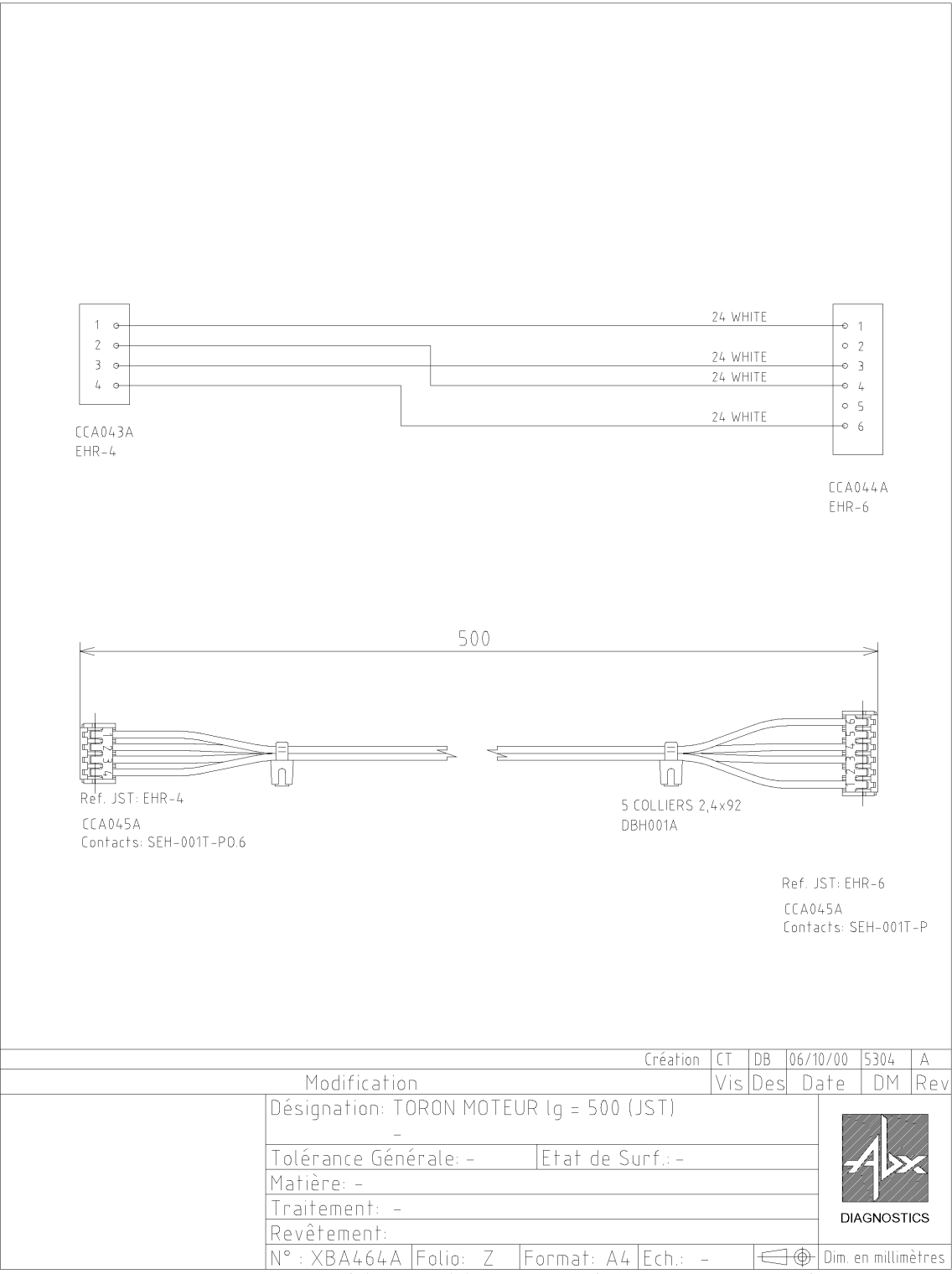
Diag.37:XBA462A Motor Jst 300mm.

3.36. XBA463A Motor Jst 400mm.



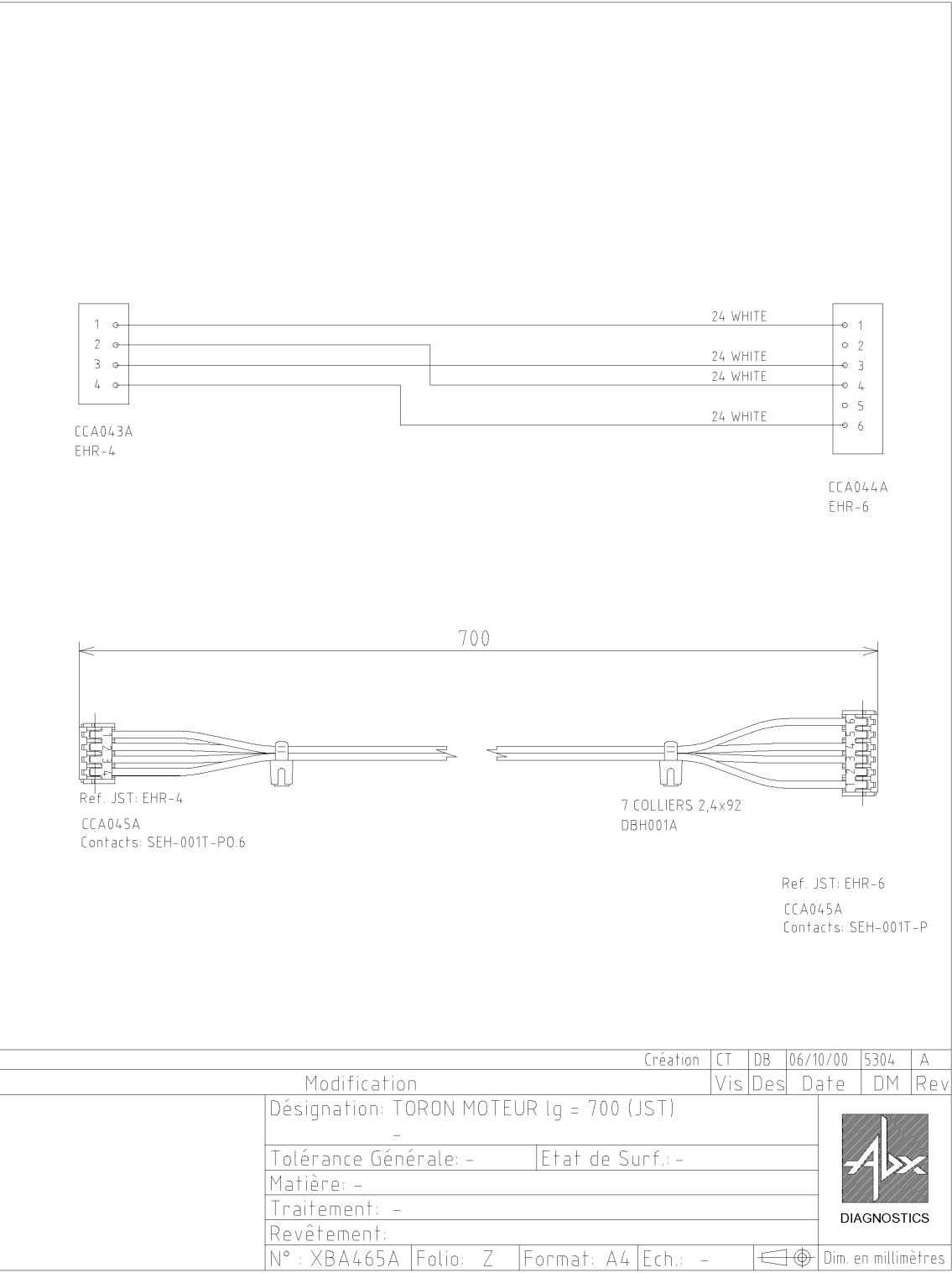
Diag.38:XBA463A Motor Jst 400mm.

3.37. XBA464A Motor Jst 500mm.



Diag.39:XBA464A Motor Jst 500mm.

3.38. XBA465A Motor Jst 700mm.

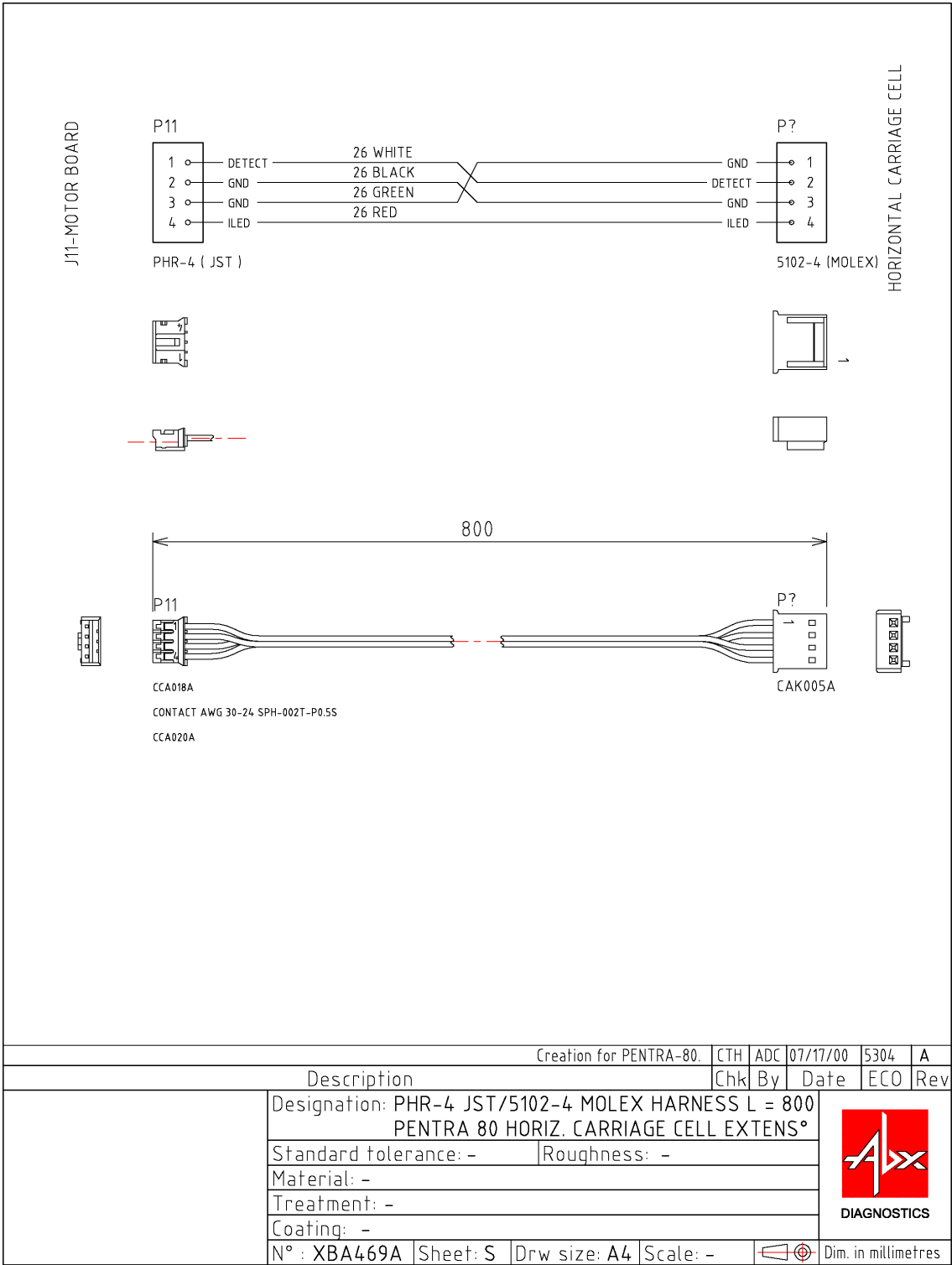


Ce plan est la propriété de la société ABX, il ne peut être reproduit ou communiqué sans autorisation

Diag.40:XBA465A Motor Jst 700mm.

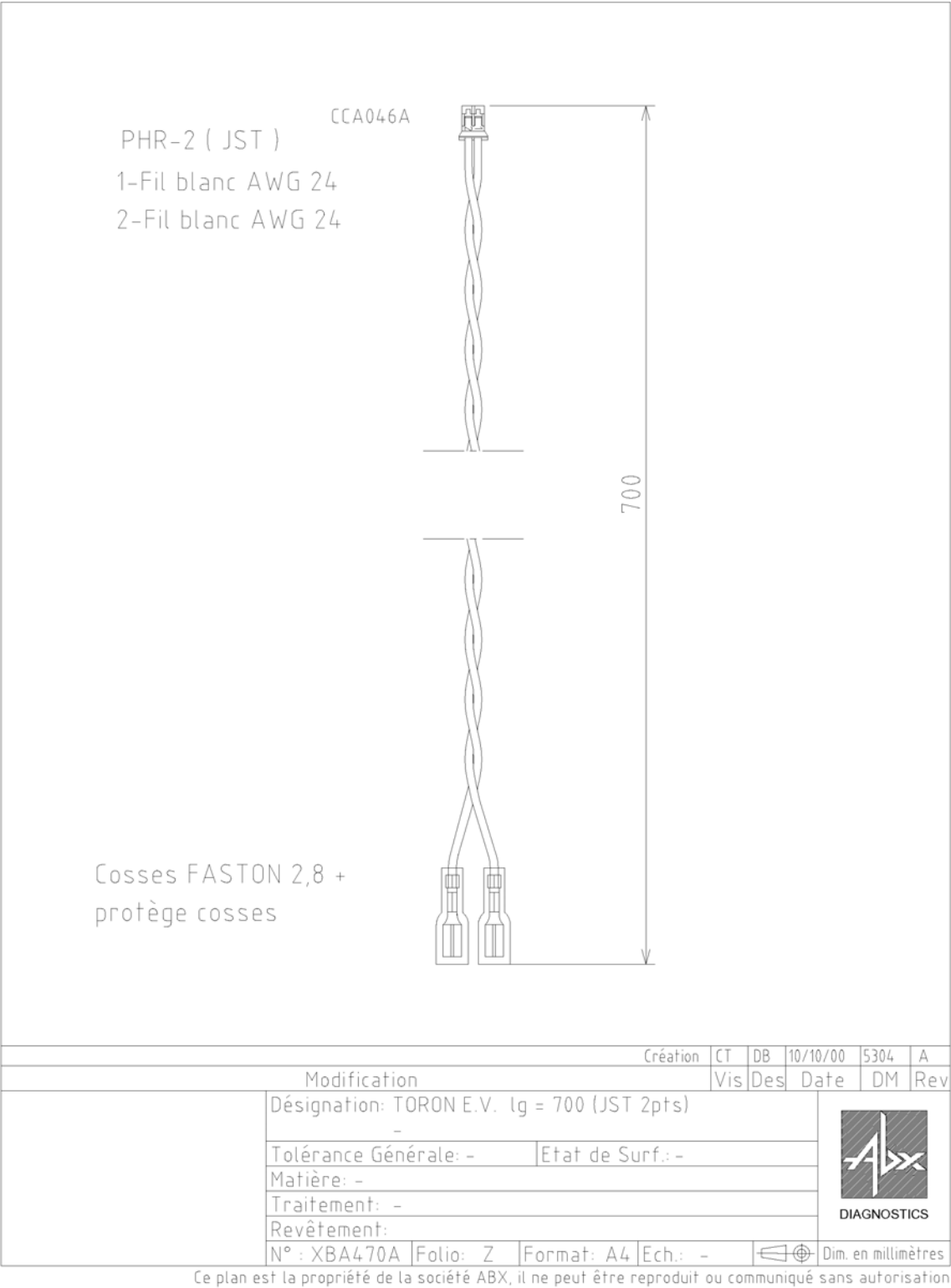


3.39. XBA469A Horizontal carriage cell extension



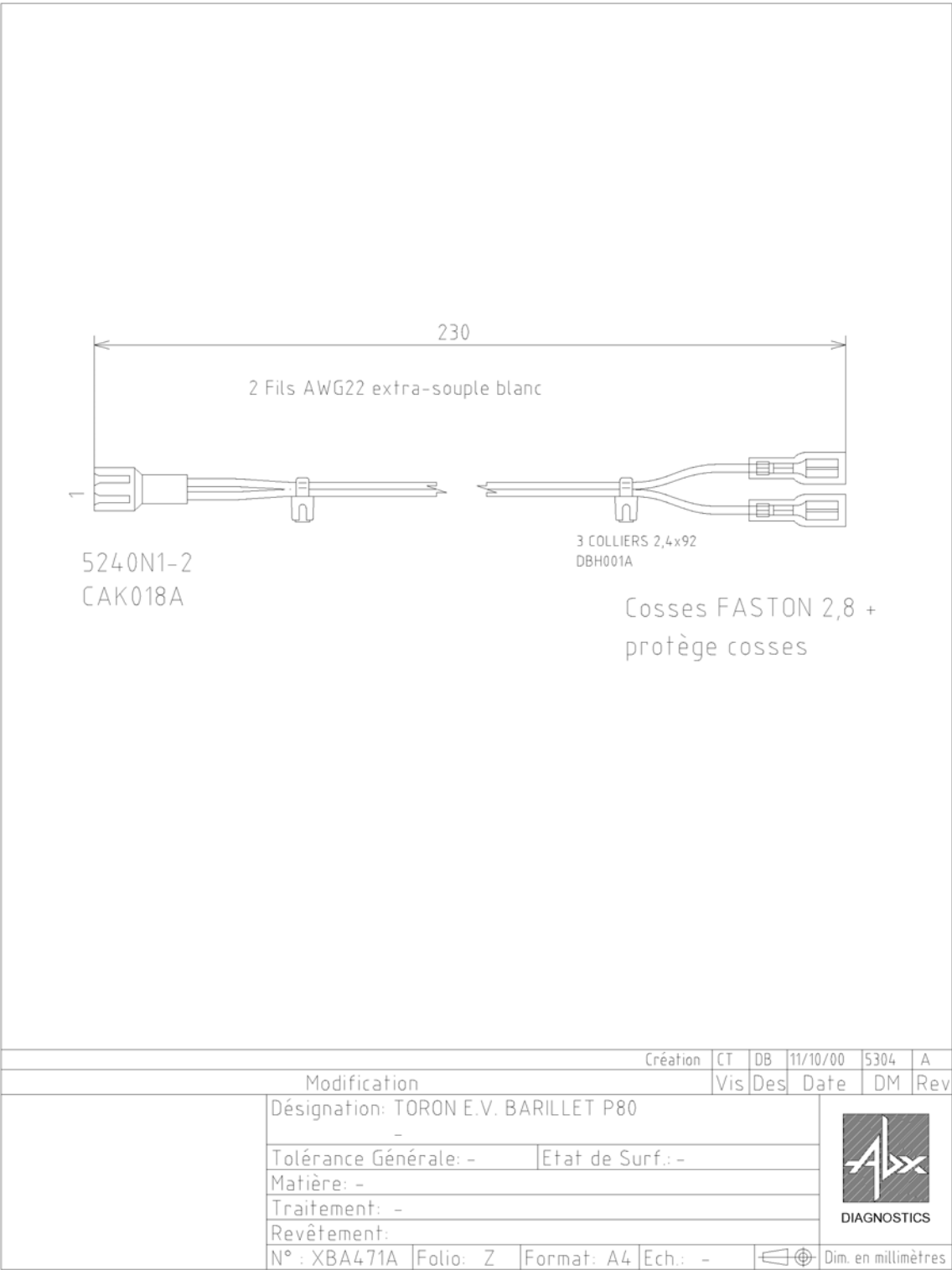
Diag.41:XBA469A Horizontal carriage cell extension

3.40. XBA470A Solenoid JST 700mm.



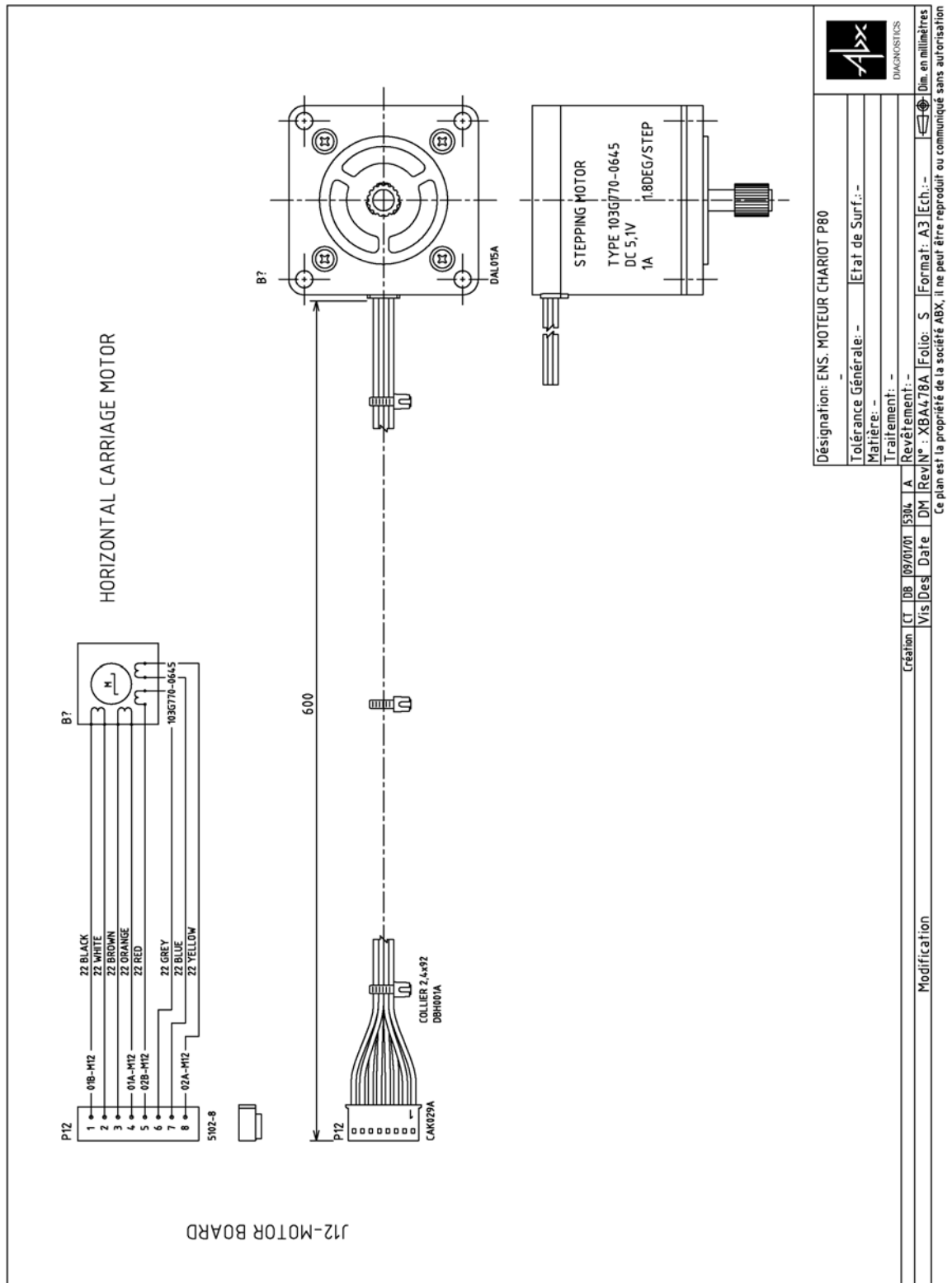
Diag.42:XBA470A Solenoid JST 700mm.

3.41. XBA471A Solenoid Molex 230mm.



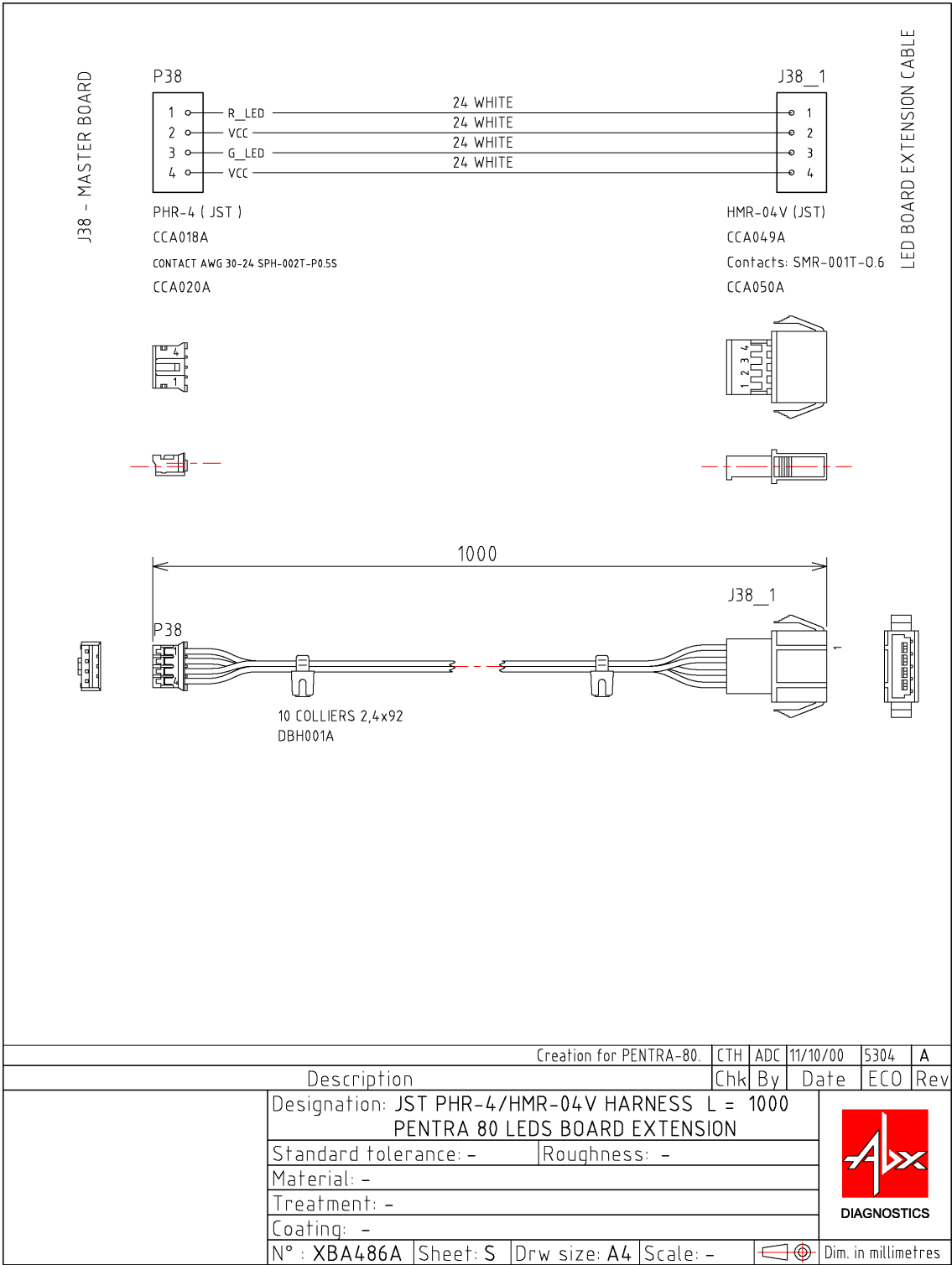
Diag.43:XBA471A Solenoid Molex 230mm.

### 3.42. XBA478A Horizontal carriage motor



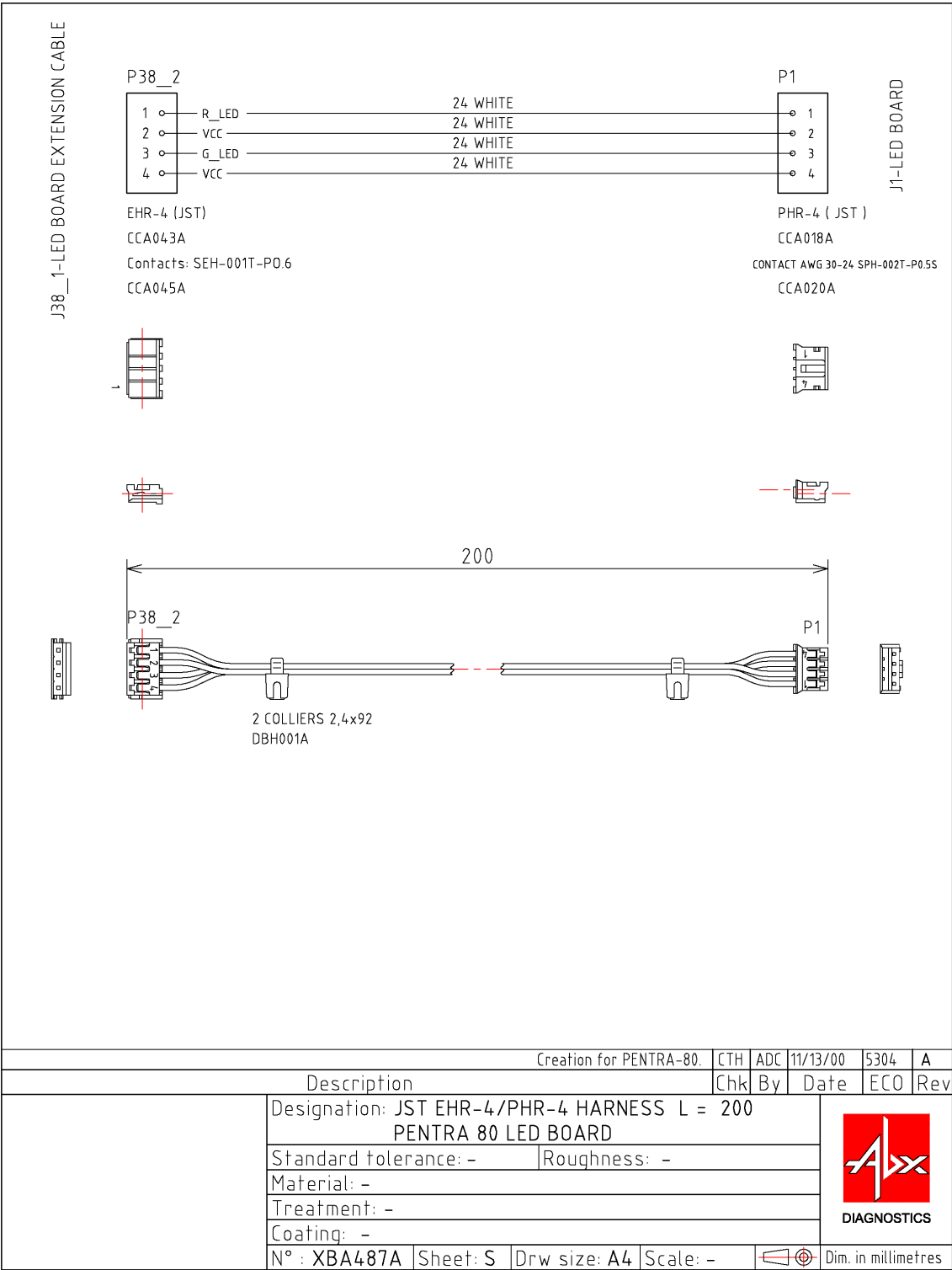
Diag.44:XBA478A Horizontal carriage motor

3.43. XBA486A LEDs extension JST 1000mm.



Diag.45:XBA486A LEDs extension JST 1000mm.

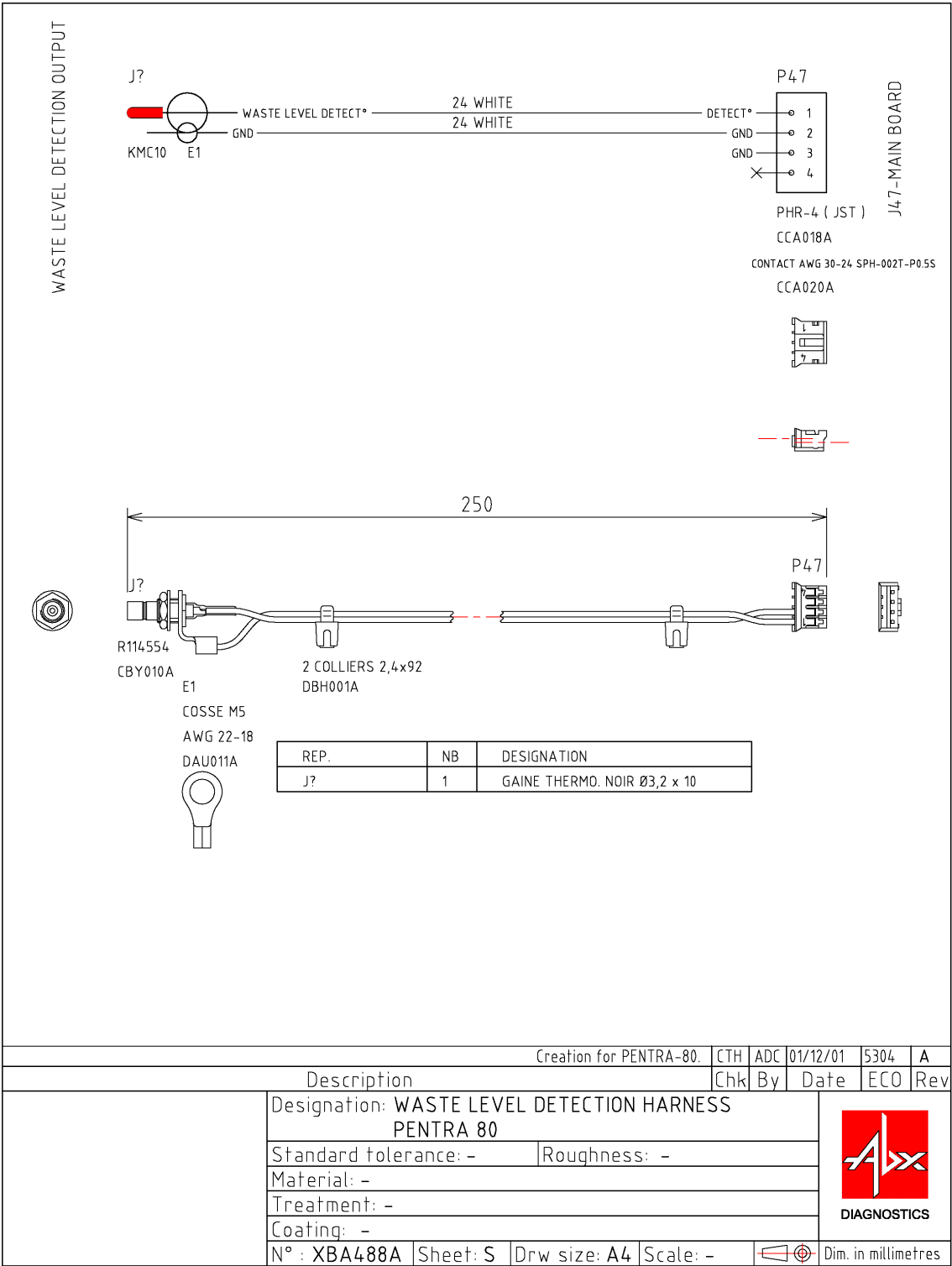
3.44. XBA487A LED JST 200mm.



This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.46:XBA487A LED JST 200mm.

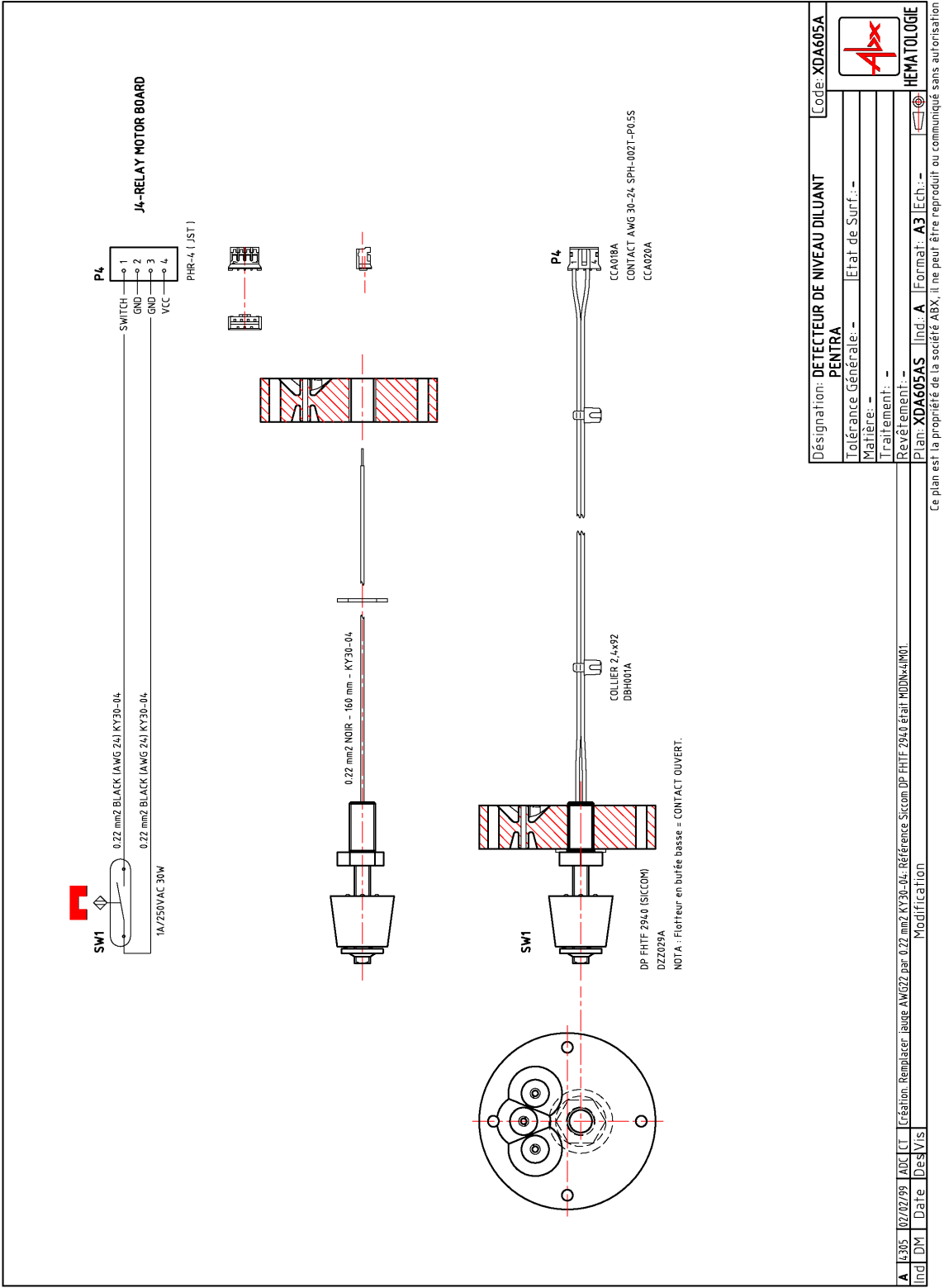
3.45. XBA488A Waste level detection



This drawing is the property of ABX, and may not be reproduced or distributed without authorization

Diag.47:XBA488A Waste level detection

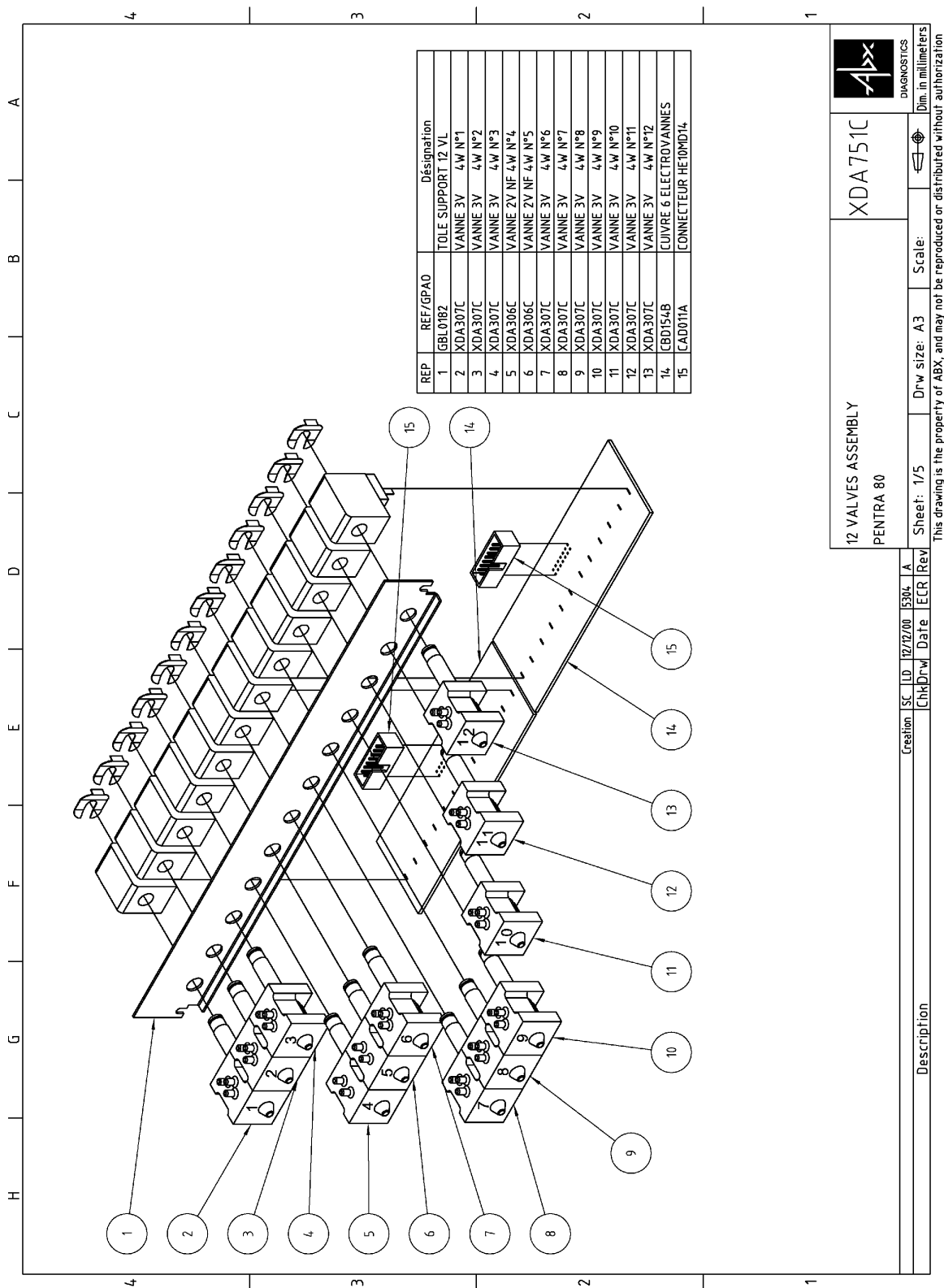
3.46. XDA605A Diluent reservoir with level detection



Diag.48:XDA605A Diluent reservoir with level detection

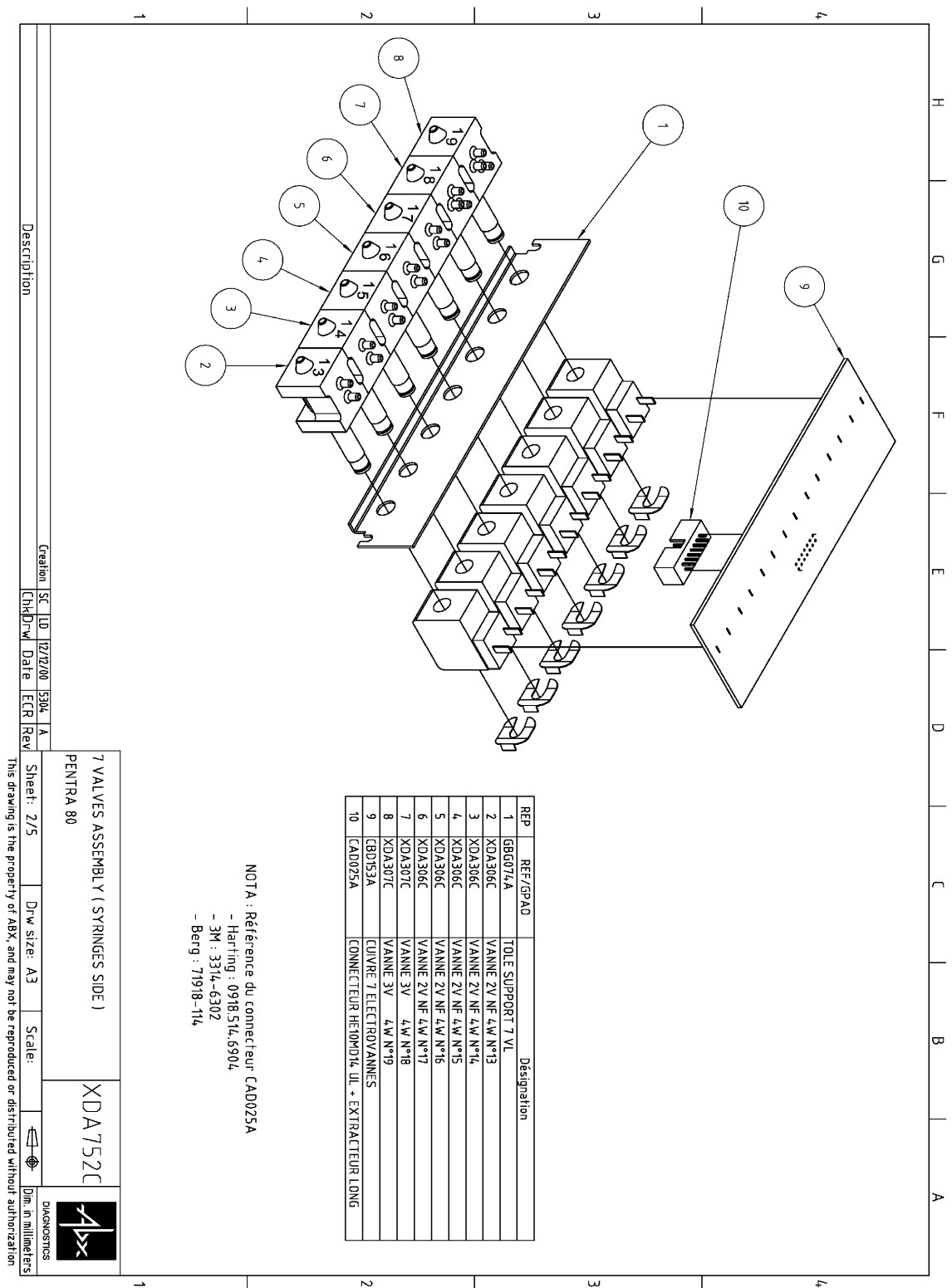


3.47. XDA751C 12 valves assy (LV1-6 & LV7-12)



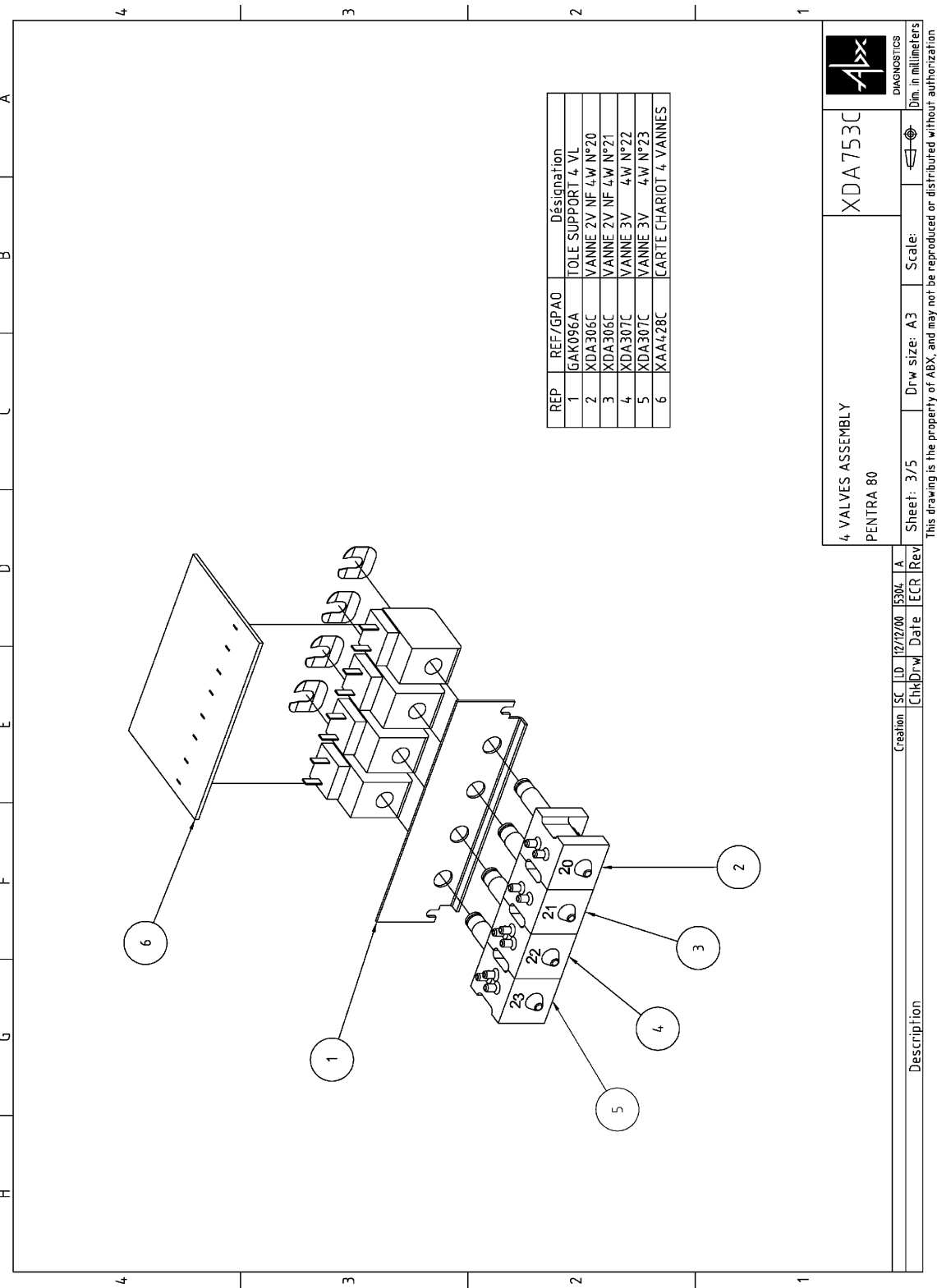
Diag.49:XDA751C 12 valves assy (LV1-6 & LV7-12)

3.48. XDA752C 7 valves assy (LV13-19)



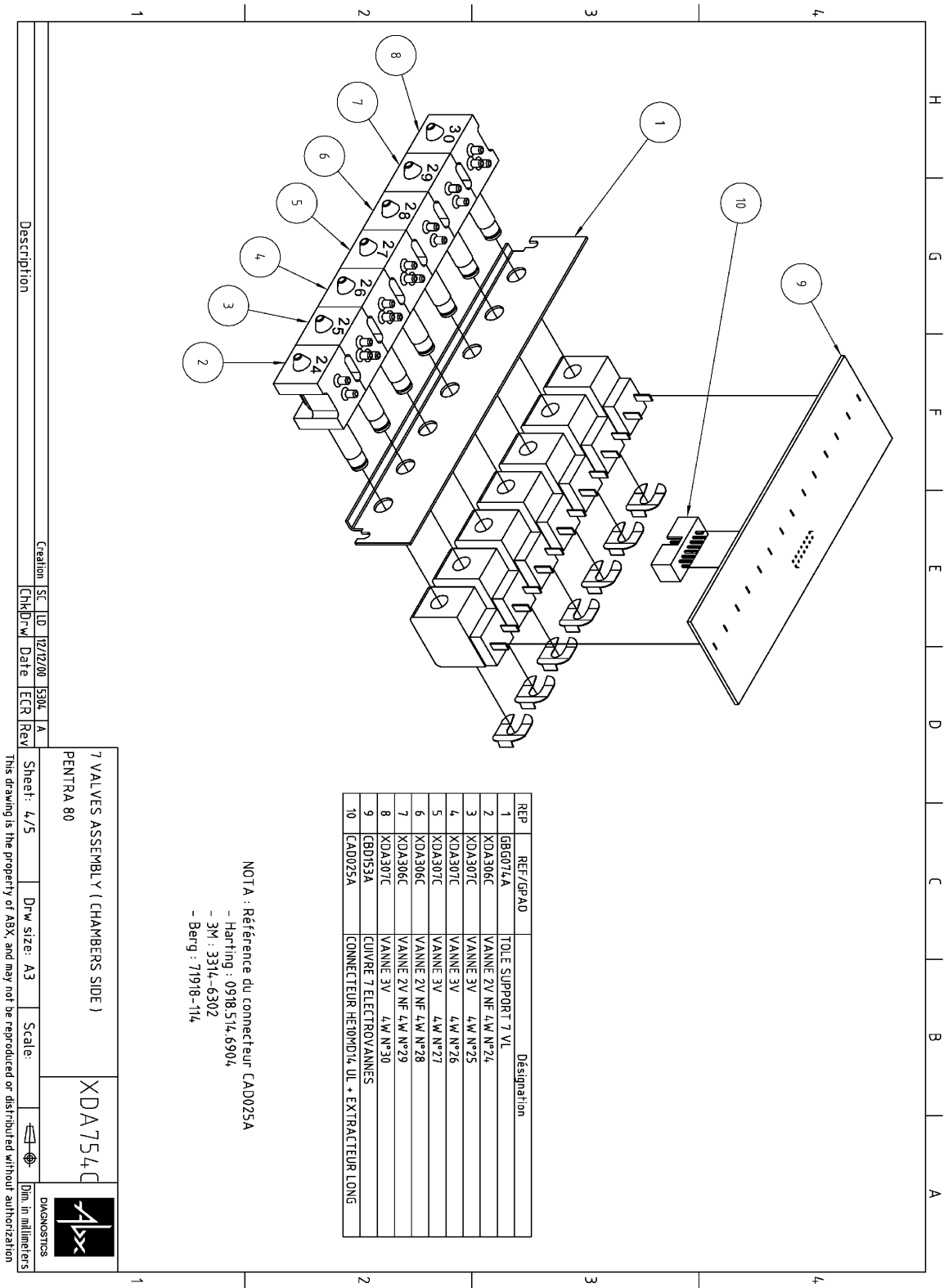
Diag.50:XDA752C 7 valves assy (LV13-19)

3.49. XDA753C Carriage valves assy (LV20-23)



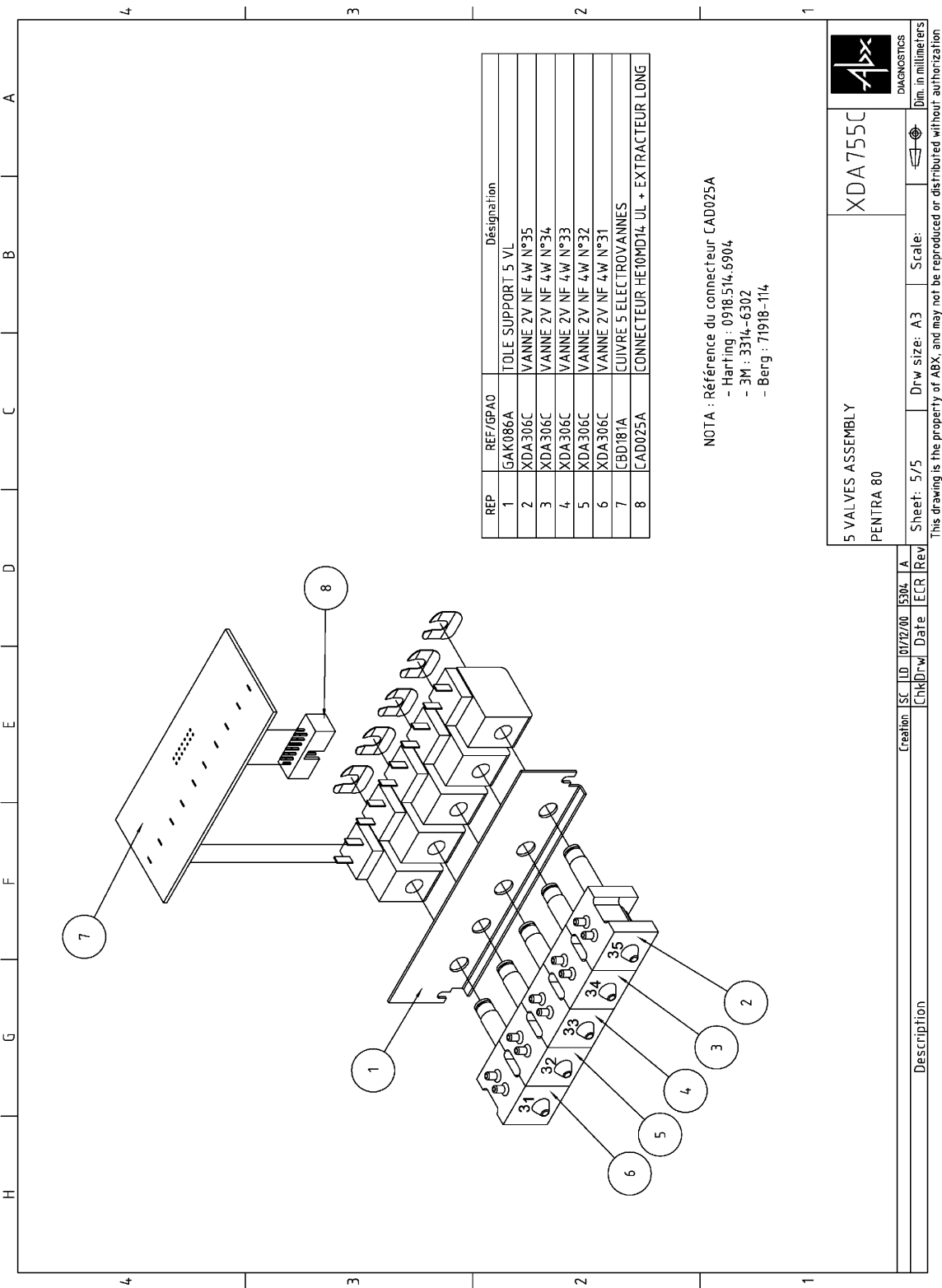
Diag.51:XDA753C Carriage valves assy (LV20-23)

3.50. XDA754C 7 valves assy (LV24-30)



Diag.52: XDA754C 7 valves assy (LV24-30)

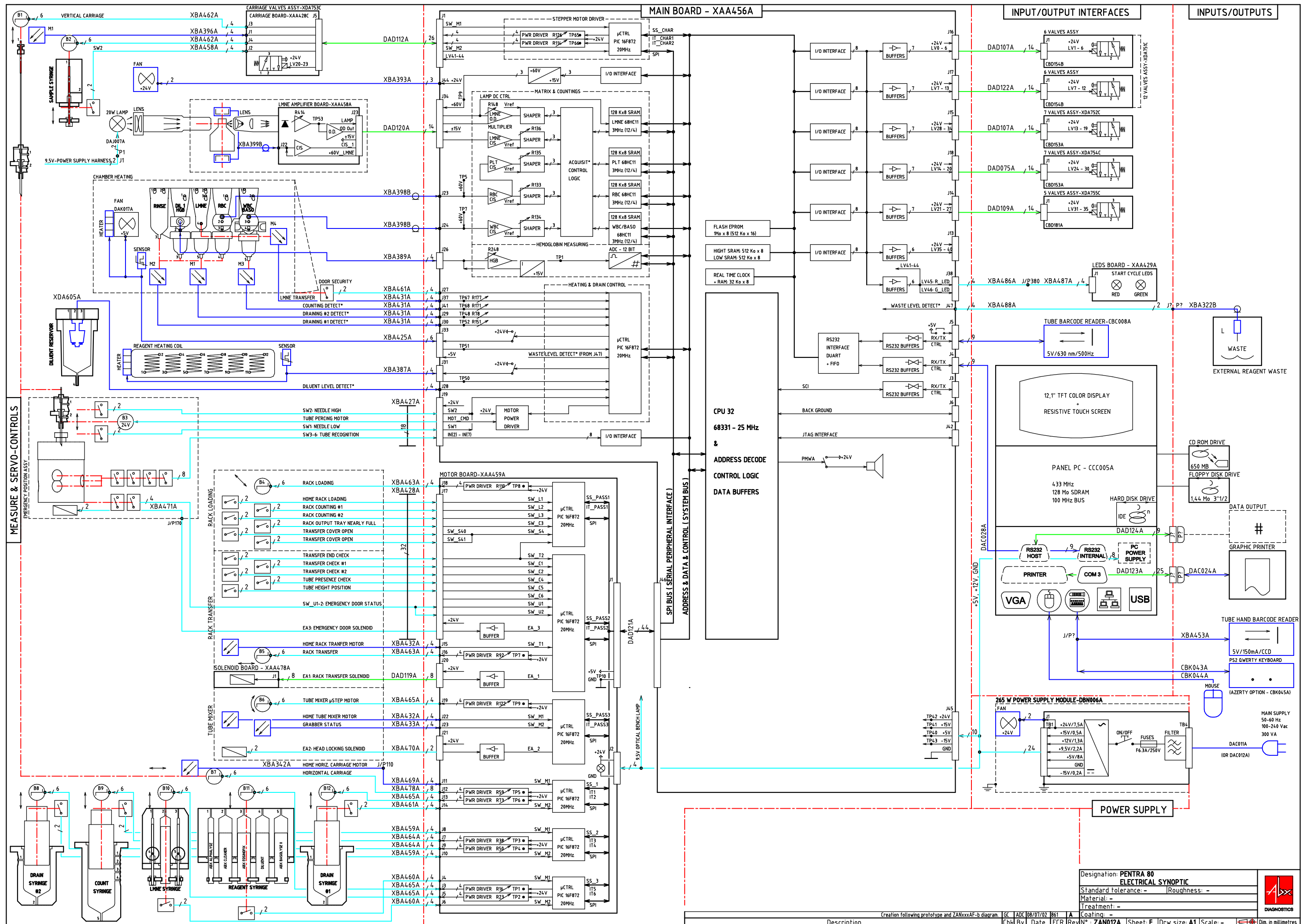
3.51. XDA755C 5 valves assy (LV31-35)



Diag.53:XDA755C 5 valves assy (LV31-35)

4. Pentra 80 synoptic

See synoptic diagram on next page.



---

## Analysis cycle technology

---

1. Analysis cycle description (Principles) .....	4-2
2. Measuring principles .....	4-4
2.1. Multi distribution sytem (MDSS) .....	4-4
2.2. CBC detection principles .....	4-5
2.3. WBC and differential count .....	4-7

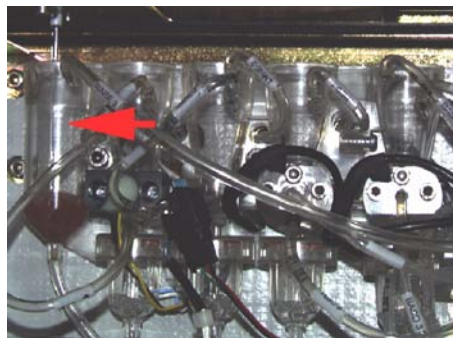


## 1. Analysis cycle description (Principles)

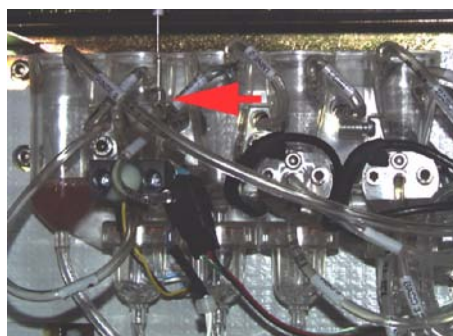
- Aspiration of blood sample from the tube through the cap (53µl)
- Translation of sampling carriage over Rinse chamber.

Cleaning of the needles:

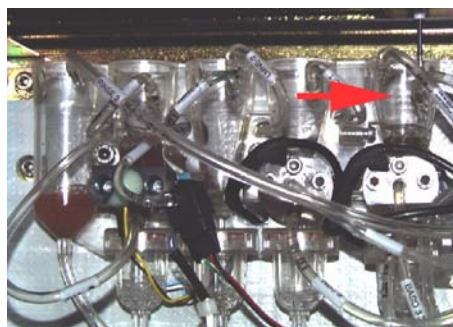
- Internal cleaning: 1ml inside piercing needle
- External cleaning: 2ml outside piercing needle
- Internal cleaning: 1ml inside piercing needle and reject of 3µl of blood (not used).



- Translation of sampling carriage DIL1 chamber (first dilution), descent of the needle.
- Positioning the needle point into a tangential flux of **ABX DILUENT** (1.65ml) and synchronised distribution of 10µl of blood.



- Translation of sampling carriage over WBC/BASO count chamber.
- Positioning the needle point into a tangential flux of 2ml of **ABX BASOLYSE II** and synchronised distribution of 10µl of blood.



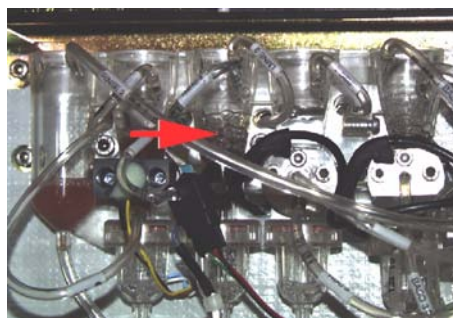
Dilution

Blood Volume: 10 µl

BASOLYSE II Volume: 2000 µl

Dilution Rate: 1/200

- Translation of sampling carriage over LMNE mixing chamber.
- Positioning the needle point into a tangential flux of 1ml of **ABX EOSINOFIX** and synchronised distribution of 25µl of blood.



Dilution

Blood Volume: 25 µl

Eosinofix Volume: 1000 µl

Diluent Volume: 1000 µl

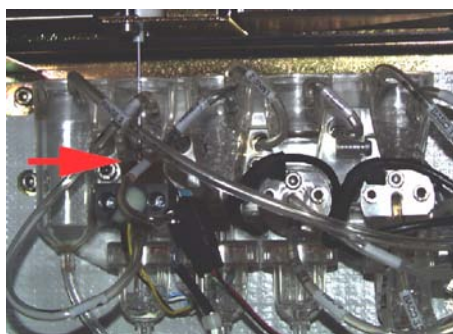
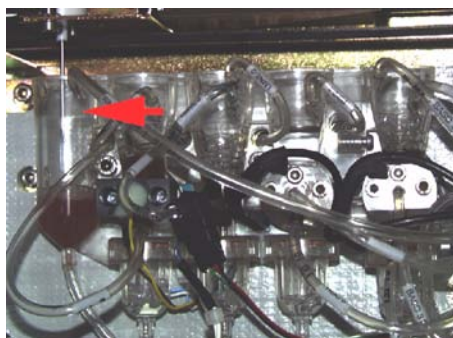
Final Dilution Rate: 1/80



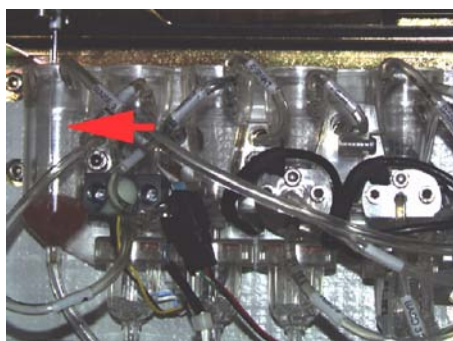
- Translation of sampling carriage over Rinse chamber
- Rinsing of the needles:
  - Internal rinsing: 0.8ml inside sampling needle
  - External rinsing: 0.5ml outside sampling needle
  - Internal rinsing: 0.5ml inside sampling needle
  - External rinsing: 0.3ml outside sampling needle

WBC and LMNE counting:

- 1ml of diluent into LMNE chamber
- Dilution transfer trough LMNE flowcell and counting during 12 seconds
- WBC\BASO counting
- Translation of sampling carriage over DIL1 chamber
- Sample of the 42.5µl of the first dilution.



- Translation of sampling carriage over Rinse chamber.
- Rinsing of the exterior of sampling needle with 0.4ml of diluent



- Translation of sampling carriage over RBC and PLT count chamber.
- Distribution of the 42.5µl of first dilution into a flux of 2.20ml of diluent.
- Distribution of 0.3ml of diluent from the interior of the needle.

Dilution

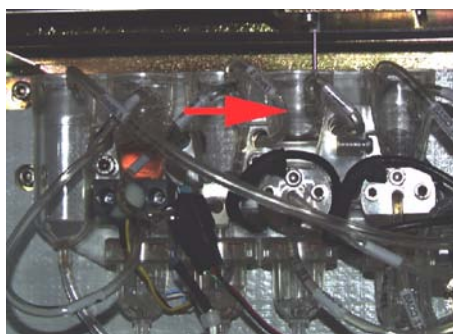
Initial Blood Volume: 10 µl

Reagent Volume (RBC chamber): 2500 µl

Final Dilution Rate: 1/10000

Hgb:

- Distribution of 0.36ml of **ABX LYSE** into DIL1 chamber while bubbling.
- WBC\BASO chamber rinsing:
- Draining and filling with 1ml of **ABX CLEANER** and 1.5ml of diluent
- RBC\Plt counting and Hgb measurement
- Chambers cleaning and Hgb blank
- Draining and filling of DIL1 chamber with 2.7ml of diluent
- Measurement of Hgb blank
- Flowcell rinsing (about 1.6ml of diluent)
- Draining and filling of RBC chamber with 2.5ml of diluent



## 2. Measuring principles

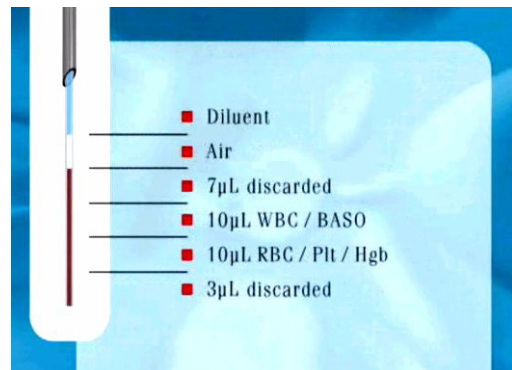
### 2.1. Multi distribution sytem (MDSS)

#### 2.1.1. CBC mode

In CBC mode, 30 $\mu$ L of whole blood is aspirated then delivered with reagents into chambers as follows:

one specimen for the first RBC/Plt dilution and the Hgb measurement.

another specimen for the BASO/WBC count.



Diag.1:Specimen distribution in CBC mode

#### 2.1.2. Diff Mode

In DIFF mode, 53 $\mu$ L of whole blood is aspirated, then delivered with reagents into chambers as follows:

one specimen for the first RBC/Plt dilution and the Hgb measurement.

another specimen for the BASO/WBC count.

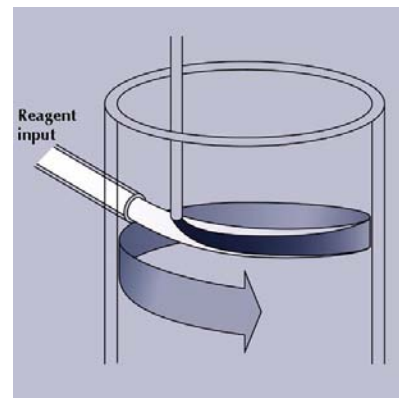
the last specimen for the LMNE matrix.



Diag.2:Specimen distribution in DIFF mode

#### 2.1.3. Specimen distribution

Specimen distribution in the chambers is carried out in a tangential flow of reagent which allows perfect mixing of the dilution and avoids any viscosity problems (this multi distribution in a reagent flow is an **ABX DIAGNOSTICS** patent).



Diag.3:Blood distribution in a tangential flow

## 2.2. CBC detection principles

### 2.2.1. RBC/Plt

Measurement of impedance variation generated by the passage of cells through a calibrated micro aperture.

The specimen is diluted in an electrolytic diluent (current conductor) and pulled through the calibrated micro-aperture. Two electrodes are placed on either side of the aperture. Electric current passes through the electrodes continuously.

When the cell passes through the aperture, electric resistance between the two electrodes increases proportionately with the cell volume.

The generated impulses have a very low voltage, which the amplification circuit increases, so that the electronic system can analyze them and eliminate the background noise.

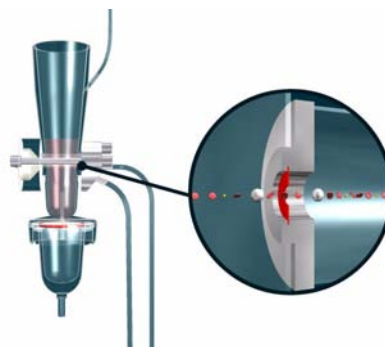
#### Results

Number of cells counted per volume unit x calibration coefficient

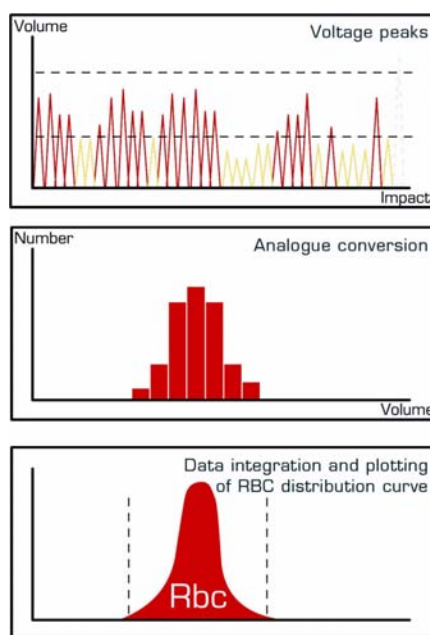
#### Histograms

**RBC:** Distribution curves on 256 counting channels from 30fl to 300fl.

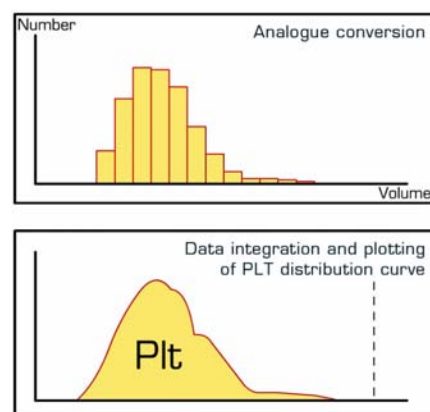
**Plt:** Distribution curves on 256 channels from 2fl to a mobile threshold. This threshold moves according to the microcyte population present in the analysis area.



Diag.4: Impedance Principles



Diag.5: RBC distribution curve



Diag.6: Plt Distribution curve

#### Dilutions

Table 1: RBC\Plt dilutions

Technical characteristics of the RED BLOOD CELL and PLATELET counts			
Initial blood volume	10 $\mu$ l	Method	Impedance
Vol. ABX DILUENT	2500 $\mu$ l	Aperture diameter	50 $\mu$ m

Table 1: RBC\Plt dilutions

Technical characteristics of the RED BLOOD CELL and PLATELET counts			
Final dilution rate**	1/10000	Count vacuum	200 mb
Temperature of reaction	35°C	Count period	2 X 6 seconds

\*\* : Two successive dilutions are carried out : Primary Dilution for RBC and Plt:

Blood (µl)	10 µl		
Vol. ABX DILUENT	1700	dilution	1/170

Secondary Dilution RBC and Plt (from the primary dilution)

Dilution (µl)	42,5 µl		
Vol. ABX DILUENT	2500	dilution	1/58,8
Final dilution: 1/170 x 1/58,8 = 1/10000			

### 2.2.2. Hgb Measurement

The hemoglobin released by the lysis of the red blood cells combines with the potassium cyanide to form the chromogenous cyanmethemoglobin compound. This compound is then measured through the optical part of the first dilution chamber using a spectrophotometric technique at a wavelength of 550 nm.

Table 2: Hgb measurement

Technical characteristics for the HGB MEASUREMENT			
Blood volume	10 µl	Method	Photometry
Vol. ABX DILUENT	1700 µl	Wavelength	550 nm
Vol. ABX LYSE	400 µl		
complement ABX DILUENT	400 µl		
Final dilution rate**	1/250		
Temperature of reaction	35°C		

### Results

Final Hgb result represents: Absorbance value obtained x coefficient of calibration.

#### Hct Measurement

The height of the impulse generated by the passage of a cell through the micro-aperture is directly proportional to the volume of the analyzed RBC.

The hematocrit is measured as a function of the numeric integration of the MCV.

### 2.2.3. RDW calculation

The study of the RBC distribution detects erythrocyte anomalies linked to anisocytosis.

A Red Cell Distribution Width (RDW) will enable you to follow the evolution of the width of the curve in relation to the cell number and average volume.

$$RDW = (K \times SD) / MCV$$

With:

- K = system constant
- SD = Determined standard deviation according to statistical studies on cell distribution.
- MCV = Mean Corpuscular Volume of erythrocytes

## 2.2.4. MCV, MCH, MCHC calculation

- MCV (Mean Cell Volume) is calculated directly from the RBC histogram.
- MCH (Mean Cell Hemoglobin) is calculated from the Hgb value and the RBC number.
- The mean hemoglobin weight in each RBC is given by the formula:

$$\text{MCH (pg)} = \text{Hgb/RBC} \times 10$$

- MCHC (Mean Corpuscular Hemoglobin Contained) is calculated according to the Hgb and Hct values. Mean Hgb concentration in the total volume of RBC is given by the formula:

$$\text{MCHC (g/dL)} = \text{Hgb/Hct} \times 100$$

## 2.2.5. MPV Measurement

The MPV (Mean Platelet Volume) is directly derived from the analysis of the platelet distribution curve.

## 2.2.6. Pct Calculation

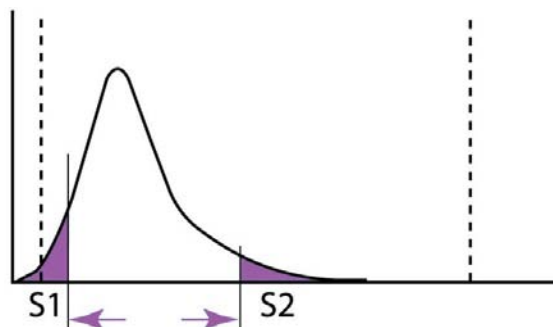
Thrombocrit is calculated according to the formula:

$$\text{Pct\%} = \text{Plt (103/\mu l)} \times \text{MPV (\mu m}^3) / 10\,000$$

## 2.2.7. PDW calculation

PDW (Platelet Distribution Width) is calculated from the Plt histogram.

The PDW is represented by the width of the curve between 15% of the number of platelets starting from 2 fl (S1), and 15% of the number of platelets beginning with the variable top threshold (S2).



Diag.7:PDW calculation

## 2.3. WBC and differential count

## 2.3.1. General principles

The WBC count is carried out twice by two different sensors:

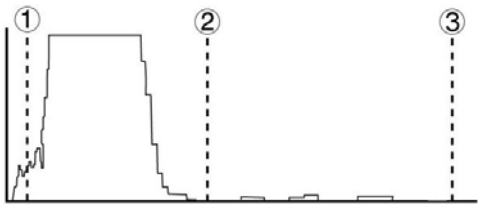
- In the BASO count chamber at the same time as the BASOS count,
  - In the optical chamber during the acquisition of the LMNE matrix.
- The reference count is the one obtained in the WBC and BASO count chamber.

2.3.2. BASO/WBC Count

Detection principle is the same as for RBC.

Differentiation between BASOs and other leukocytes is obtained by means of the **BASOLYSE II** specific lysing action.

All the WBCs are counted between the electrical threshold <0> threshold <BA3>. The basophils are located from threshold <BA2> to threshold <BA3>.



Diag.8:WBC/BASO histogram

Table 3: WBC\Baso count

Technical characteristics of the WBC/BASO counts			
Initial blood volume	10 µl (CBC or CBC/DIFF)	Method	Impedance
Vol. ABX BASOLYSE II	2000 µl	Aperture diameter	80 µm
Final dilution rate**	1/200	Count vacuum	200 mb
Temperature of reaction	35°C	Count period	2 X 6 seconds

Results

WBC: Number of cells per volume x coefficient of calibration.

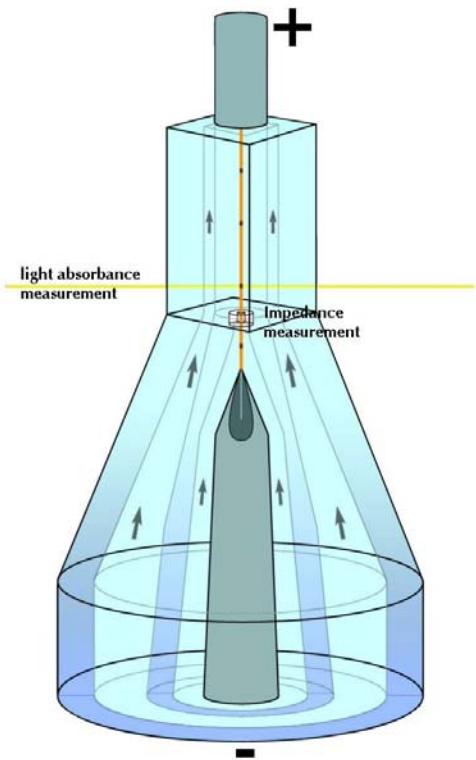
BASO: Number of cells per volume x coefficient of calibration in percentage regarding the total number of leukocytes (BASO + WBC nuclei).

2.3.3. LMNE Matrix

- The WBC and Differential count are based on 3 essential principles:
- The double hydrodynamic sleeving «DHSS» (ABX DIAGNOSTICS patent)
  - The volume measurement (*impedance changes*).
  - The measurement of transmitted light with 0° angle, which permits a response according to the internal structure of each element and its absorbance by means of incident light diffusion.

25µl of whole blood is delivered to the LMNE chamber in a flow of EOSINOFIX. This reagent lyses the RBC, stabilizes the WBC in their native forms and stains the eosinophil nuclei with a specific coloration.

The solution is then stabilized with diluent and transferred to the measuring chamber. Each cell is measured both in absorbance (cytochemistry) and resistivity (volume).

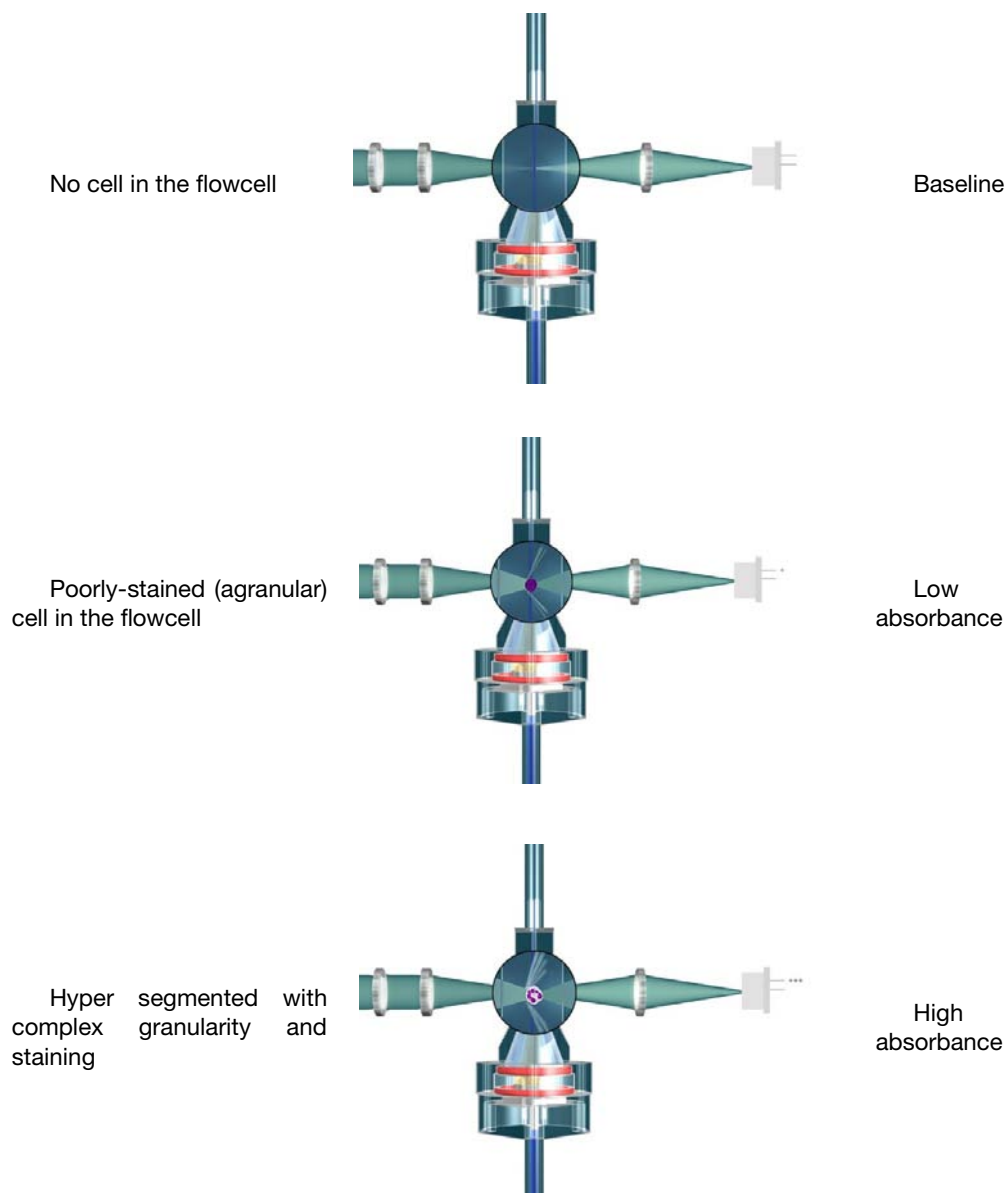


Diag.9:DHSS principles

Table 4: WBC counts

Technical characteristics of the WBC counts during the acquisition of the matrix			
Initial blood volume	25 µl	Method	Impedance with hydrofocus
Vol. ABX Eosinofix	1000 µl	Aperture diameter	60 µm
Diluent Volume	1000 µl	Flow diameter	42 µm
Final dilution rate	1/80	Injection duration	12 s
Temperature of reaction	35°C	Volume injected	72µl
Incubation duration	12s		





Diag.10: Absorbance measurement

## Results

From these measurements, a matrix is drawn up with volumes on the X-axis and optical transmission on the Y-axis. The study of the matrix image permits the clear differentiation of 4 out of 5 leukocyte populations. As a matter of fact, the basophil population is very small compared to the others.

**MONOCYTES:** The monocytes, being cells with large kidney shaped nuclei and a large non-granular cytoplasm, will neither be scattered nor absorb a large amount of light. They will therefore be positioned in the lower part of the optical axis but clearly to the right of the volume axis.

**LYMPHOCYTES:** The lymphocytes being small with regular shape, are positioned in the lower part of both the optical axis and volume axis. Normal lymphocyte populations are generally observed with a good volume homogeneity. The far left side of the lymphocyte zone should normally be empty, but when small lymphocytes are present, population may exist in this area. The presence of platelet aggregates is detected by a distribution pattern that moves from the origin of the matrix (background zone) into the lymphocyte zone. The NRBCs with their cytoplasmic membranes lysed like the erythrocytes, will have their nuclei situated to the far left side of the lymphocyte zone.



**EOSINOPHILS:** With reagent action on cytoplasmic membranes, the leukocytes keep their native size and only eosinophils are colored for optical separation. Eosinophils will be situated in the upper part of the optical Y-axis due to their strong absorbance qualities and their size, which is nearly equivalent to large neutrophils.

**NEUTROPHILS:** The neutrophils, with their cytoplasmic granules and their generally segmented nuclei, will scatter light depending on their morphological complexity. A hypersegmented neutrophil will give an increased optical response with respect to a young neutrophil population which will be in the upper position of the optical axis depending on the presence of segmentation and/or granules.

**Additional parameters:** LIC (Large Immature Cells) and ALY (Atypical Lymphocytes) complete the panel available on the matrix.

The immature granulocytic cells are detected by their larger volumes and by the presence of granules which increase the intensity of the scattered light. Therefore, cells such as metamyelocytes will be found clearly to the right of the neutrophils and nearly at the same level. Myelocytes and promyelocytes will be found in saturation position on the far right of the matrix. These last three populations will be counted as LIC (Large Immature Cells) and their given results are included in the neutrophil value. The blast cells will be found generally to the right of the monocytes, and, as such, will increase the LIC count. Small blasts will be found between the normal lymphocytes and monocytes. Platelets and debris from erythrocyte lysis represent the background noise population located in the lower left area of the matrix. Most of the population partition thresholds are fixed and give the limits of the morphological normality of leukocytes. Changes in the morphology of a population will be expressed on the matrix by a shifting of the corresponding population.

A Blast alarm is generated from increased counts within the LIC area, this is correlated with Blast detection on the Basophil curve.

Large lymphocytes are detected in the ALY (Atypical Lymphocytes) zone, where reactive lymphoid forms, stimulated lymphocytes and plasmocytes are also to be found.



---

## Software release

---

1. Service software overview .....	5-2
1.1. Super User Menu.....	5-2
1.2. Miniclean .....	5-3
1.3. Concentrated Cleaning .....	5-3
1.4. Autoclean.....	5-3
1.5. Technician Menu .....	5-3
2. Windows Explorer Access .....	5-4
3. Software releases .....	5-4
3.1. Software modification.....	5-4

## 1. Service software overview

### 1.1. Super User Menu



- Mechanical
- Hydraulic
- Others

#### 1.1.1. Mechanical



- Initialisation
- Check Motors
- Check Valves
- Check Sensors
- Sampler test
- Holder Adjustment
- Rack Adjustment

#### 1.1.2. Hydraulic



- Drain Chambers
- Prime Cycles
- Unprime Cycles
- Clean Cycles

#### 1.1.3. Others



- Cycles Counter
- Run Park Syringes Position
- Run Maintenance Carriage Pos.
- Calibration Coefficients

1.2. Miniclean



- Miniclean

1.3. Concentrated Cleaning



- Concentrated Cleaning

1.4. Autoclean



- Autoclean

1.5. Technician Menu



- Measurement
- Gains
- Others

1.5.1. Measurement



- Gain Adjustment
- LMNE Adjustment
- Aperture Current
- Pulse Adjustment

## 1.5.2. Gains



- Thermic Adjustment
- M.D.S.S. Adjustment
- Liquid Sensor Adjustment
- Vacuum Control
- Sampler Adjust.
- Bubbling

## 1.5.3. Others



- LMNE Calibration
- Cycles
- Calibration Coefficients
- Blank Values
- System Tools
- Burn In Cycles
- Barcode Setup

## 2. Windows Explorer Access

Enter: **Menu \ Service \ Technician Menu \ Others \ System Tools** then press «Launch Windows Explorer» button.

## 3. Software releases

V1.01: First release of technical manual.

Second release of the manual:

- Pentra 80 historic:
  - RAH919A technical note: V1.01 for P80 with version V1.00
  - RAH921A technical note: V1.01 for P80 with version <V1.00
  - RAH938C technical note: V1.1.2
  - RAH990D technical note: V1.3.2
- Pentra XL80 historic:
  - RAN002B Technical note: V1.1.1

---

## Alarms & error list

---

1. Analyzer error types and help messages .....	6-2
2. Transfer error types an help messages .....	6-3
3. STAT mode error type and help messages.....	6-4
4. Environment error type and help messages .....	6-4
5. User error types and help messages .....	6-5
6. Expiration date error types and help messages .....	6-5
7. Analyzer internal barcode error types and help messages .....	6-6

## 1. Analyzer error types and help messages

Table 1: Analyzer error types and help messages

Alarm	Error type	Help message
Carriage motor failure	Carriage Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
Carriage mechanism not reaching home	Carriage Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
Counting syringe motor failure	Counting Syringe Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
Counting syringe mechanism not reaching home	Counting Syringe Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
Diluter syringe motor failure	Diluter Syringe Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
Diluter syringe mechanism not reaching home	Diluter Syringe Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
DRAIN 1 syringe motor failure	DRAIN 1 Syringe Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
DRAIN 1 syringe mechanism not reaching home	DRAIN 1 Syringe Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
DRAIN 2 syringe motor failure	DRAIN 2 Syringe Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
DRAIN 2 syringe mechanism not reaching home	DRAIN 2 Syringe Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
Drain sensor [sensor number (1, 2 or 3)] time out	Drain Sensor	Run an Auto Clean
Injection syringe motor failure	Injection Syringe Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
Injection syringe mechanism not reaching home	Injection Syringe Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
LMNE transfer sensor time out	LMNE transfer sensor	Run an Auto Clean
Needle motor failure	Needle Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
Needle mechanism not reaching home	Needle Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
Piercing UP or DOWN bad position	Piercing Syringe Motor	Run an Auto Clean Check Motor in Service Menu
Reagent temperature out of range. Value Min. & Max.	Reagent Temperature	Run an initialization
Reagent Temperature sensor not connected	Reagent Temperature sensor	Run an initialization
Reagent Temperature sensor failure	Reagent Temperature sensor	Run an initialization
Sampling syringe motor failure	Sampling Syringe Motor home switch always detected	Run an Auto Clean Check Motor in Service Menu
Sampling syringe mechanism not reaching home	Sampling Syringe Motor Mechanism initialization failed	Run an Auto Clean Check Motor in Service Menu
Thermostated Compartment Temperature sensor not connected	Thermostated Compartment Temperature	Run an initialization
Thermostated Compartment Temperature sensor failure	Thermostated Compartment Temperature	Run an initialization



Table 1: Analyzer error types and help messages

Alarm	Error type	Help message
Thermostated Compartment temperature out of range. Value Min. & Max.	Thermostated Compartment Temperature	Run an initialization

## 2. Transfer error types an help messages

Table 2: Transfer error types and help messages

Alarm	Error type	Help message
Loading motor mechanism not reaching home	Sampler Loading Motor Mechanism initialization failed	Run an initialization Check motor in Service Menu
Loading motor failure	Sampler Loading Motor home switch always detected	Run an initialization Check motor in Service Menu
Stop rack loading switch not detected	Sampler Loading Motor	Run an initialization Check motor in Service Menu
Stop rack loading switch detected	Sampler Loading Motor	Run an initialization Check motor in Service Menu
Sampler Transfer mechanism not reaching home	Sampler Transfer Motor Mechanism initialization failed	Run an initialization Check motor in Service Menu
Sampler Transfer motor failure	Sampler Transfer Motor home sensor always detected	Run an initialization Check motor in Service Menu
Stop rack Transfer switch not detected	Sampler Transfer Motor End transfer rack switch not detected	Run an initialization Check switch in Service Menu
Stop rack Transfer switch detected	Sampler Transfer Motor End transfer rack switch always detected	Run an initialization Check switch in Service Menu
Mixer mechanism not reaching home	Mixer Motor Mechanism initialization failed	Run an initialization Check motor in Service Menu
Mixer motor failure	Mixer Motor home sensor always detected	Run an initialization Check motor in Service Menu
Mixer Bad graber position	Mixer Motor Grabers sensor position not detected	Run an initialization Check motor in Service Menu
Mixer Bad graber position	Mixer Motor Grabers sensor position detected	Run an initialization Check motor in Service Menu
Rack in rong side position	Rack in the wrong side in loading area	Set rack in the right side position and restart automatic cycle
No rack	No Rack in loading area	No message
Unloading area full	Unloading area full	Unload racks and restart automatic cycle
Tube too high in rack	Tube too high. tube may not be correctly inserted in rack	Run an initialization. Open left front cover and remove rack from loading area. Close left front cover and restart automatic cycle
Bad rack transfer movement (left)	Movement control	Run an initialization
Bad rack transfer movement (right)	Movement control	Run an initialization
Front cover open	Front cover open	Close front covers Run an initialization

### 3. STAT mode error type and help messages

Table 3: STAT mode error types and help messages

Alarm	Error type	Help message
Tube holder mechanism failure	Door not open	No message

### 4. Environment error type and help messages

Table 4: Environment error types and help messages

Alarm	Error type	Help message
%d Incoherent(s) Result(s) for %s	Incoherent Results	Run an initialization
Communication With Analyzer Cut Off	System	Run an initialization
Communication With Analyzer Failed	System	Run an initialization
End Sampler Transfer Sensor Error	Sensor state	Run an initialization
Error on raw results sending	Result failed	Run an initialization
Holder Sensor 1 in Wrong Position	Sensor state	Run an initialization
Holder Sensor 2 in Wrong Position	Sensor state	Run an initialization
Holder Sensor 3 in Wrong Position	Sensor state	Run an initialization
Holder Sensor 4 in Wrong Position	Sensor state	Run an initialization
Loader Left Sensor Error	Sensor state	Run an initialization
Loader Right Sensor Error	Sensor state	Run an initialization
Lower Piercing Sensor in Wrong Position	Sensor state	Run an initialization
Mismatch Between the First and Second Barcode Tube Read on Rack %d Pos. %d	Barcode	Run an initialization
No diluent in analyzer reservoir	Incorrect level of diluent into reservoir	Check diluent level and run a prime diluent cycle
Printer alarm	Printer problem	Check printer
Printer module closed	Software	No message
QC Failed	QC Failed	Ckeck Quality Control data in QC screen
Rack Moving Left Sensor Error	Sensor state	Run an initialization
Rack Moving Right Sensor Error	Sensor state	Run an initialization
Rack not identified	No read of Rack Barcode Label	Check barcode label
Reagent level too low for daily workload	Out of Reagent	Check reagent
Reagent level too low to run a analysys	Out of Reagent	Check reagent and restart automatic cycle
Reagent level too low to run a rack	Out of Reagent	Check reagent and restart automatic cycle

Table 4: Environment error types and help messages

Alarm	Error type	Help message
Result not stored	Software	Run an autoclean
RS232 alarm	RS232 external problem	Check host connection
Sample ID %d already in progress	Software	No message
SIL communication module closed	Software	No message
Tube Detection Sensor in Wrong Position	Sensor state	Run an initialization
Tube Level Detection Sensor in Wrong Position	Sensor state	Run an initialization
Two racks with same ID %d in transfer rail	Barcode	No message
Unable to launch print module	Software	No message
Unable to launch SIL communication module	Software	No message
Unloader Sensor in Wrong Position	Sensor state	Run an initialization
Upper Piercing Sensor in Wrong Position	Sensor state	Run an initialization
Waste container full	Waste Container Full	Empty waste container and restart automatic cycle
XB failed	XB failed	Ckeck XB in XB screen

## 5. User error types and help messages

Table 5: User error types and help messages

Alarm	Error type	Help message
Instrument stopped by user		Run an AutoClean
Instrument stopped by user at the end of analysis		Run an Initialization
Instrument stopped by user at the end of rack		

## 6. Expiration date error types and help messages

Table 6: Expiration date error types and help messages

Alarm	Error type	Help message
Reagent(s) %s expired		Change reagent and restart automatic cycle
QC Lot Nb\Barcode %s expired		Check QC expiration date and use another QC Lot

## 7. Analyzer internal barcode error types and help messages

Table 7: Analyzer internal barcode error types and help messages

Alarm	Error type	Help message
Com error on slave %d	Communication error with slave	Run an Initialization
Error management failed	Unkwon cycle	Run an Initialization
Error on cycle %d		Run an Initialization
Error on start internal chrono.		Run an Initialization
Hgb Blank Error Management	Hgb blank cycle incorrect	Run an Autoclean
Home Motor %d error		Run an Initialization
Incorrect pos.motor carriage (%d) Min : %d Max : %d	Carriage motor bad position	Run an Initialization
Incorrect pos.motor counting (%d) Min : %d Max : %d (Incorrect pos.motor PRESSURE (%d) Min : %d Max : %d)	Pressure motor bad position	Run an Initialization
Incorrect pos.motor diluter (%d) Min : %d Max : %d	Diluter motor bad position	Run an Initialization
Incorrect pos.motor drain 1 (%d) Min : %d Max : %d (Incorrect pos.motor FLUSH (%d) Min : %d Max : %d)	Flush motor bad position	Run an Initialization
Incorrect pos.motor drain 2 (%d) Min : %d Max : %d	DRAINING_2 motor bad position	Run an Initialization
Incorrect pos.motor injector (%d) Min : %d Max : %d	Injector motor bad position	Run an Initialization
Incorrect pos.motor loading (%d) Min : %d Max : %d	Loader motor bad position	Run an Initialization
Incorrect pos.motor mixer (%d) Min : %d Max : %d	Mixer motor bad position	Run an Initialization
Incorrect pos.motor needle (%d) Min : %d Max : %d	Needle motor bad position	Run an Initialization
Incorrect pos.motor sampling (%d) Min : %d Max : %d	Sampling motor bad position	Run an Initialization
Incorrect pos.motor tranfer (%d) Min : %d Max : %d	Translation motor bad position	Run an Initialization
Internal Barcode Error	Barcode internal connection problem	Run an Initialization
Internal synchronization failed	System stop due to synchronization problem	Run an Autoclean
Motor %d is busy		Run an Initialization
Run a new cycle while analyzer is busy	Analyzer already in cycle	Run an Autoclean
Valve already activated		Run an Initialization

---

## Maintenance

---

1. Maintenance .....	7-2
1.1. Introduction.....	7-2
1.2. Daily customer maintenance .....	7-2
1.3. Weekly customer maintenance.....	7-2
1.4. Maintenance table.....	7-2
2. Maintenance kits .....	7-3
2.1. 6 month maintenance kit.....	7-3
2.2. Yearly maintenance kit .....	7-3
2.3. Pistons maintenance kit .....	7-3
2.4. Fitting kit .....	7-4
2.5. Screws kit.....	7-4
3. Maintenance procedures .....	7-4
3.1. Required tools and products .....	7-4
3.2. Procedures chart table .....	7-5
3.3. Training department procedure list .....	7-7

## 1. Maintenance

### 1.1. Introduction



Customer maintenance has to be carried out according to the recommended frequency chart table and after having attended an ABX approved customer training course.  
The system warranty may be affected if damage occurs after a non trained technician intervenes or if replaced spare parts and consumables do not come from an ABX approved origin.

### 1.2. Daily customer maintenance

No special adjustment or maintenance has to be done on your equipment if the recommended startup and shutdown procedures are explicitly respected.  
See User's manual for daily rinsing and cleaning of the system.

### 1.3. Weekly customer maintenance

An overall check for cleanliness of the system is recommended every week. All traces of blood or reagent have to be wiped off as soon as possible using a piece of cloth and distilled water.



Never use solvent or abrasive cleaning to clean the system.

### 1.4. Maintenance table

Pentra 80 maintenance is scheduled on 3 different maintenance kits. The maintenance schedule depends on the number of cycles per day, follow the chart table to know kit part number to be used.

Table 1: Maintenance table

Cycles per day	<30		30 to 120				>120		Kit P/n
Maintenance each	1y.	2y.	6m.	1y.	18m.	2y.	6m.	1y.	
Needle O'ring	X	X	X	X	X	X	X	X	XEA710BS Procedure: RAS325
Reagent syringe O'ring	X	X	X	X	X	X	X	X	
Draining and Counting syringes O'ring	X	X	X	X	X	X	X	X	
Sampling syringe	X	X		X		X	X	X	XEA486CS Procedure: RAS326
5DIFF syringe	X	X		X		X	X	X	
Draining syringe	X	X		X		X	X	X	
Optical bench lamp	X	X		X		X	X	X	
LMNE flowcell coaxial	X	X		X		X	X	X	
Diluent tank joint	X	X		X		X	X	X	
Counting heads	X	X		X		X	X	X	XEA711CS Procedure: RAS327
Sampling probe replacement		X				X		X	
Reagent pistons replacement		X				X		X	
Counting and draining syringe pistons replacement		X				X		X	

## 2. Maintenance kits

### 2.1. 6 month maintenance kit

Table 2: 6 Month maintenance kit XEA710BS

P/N	Designation	Qty
FAA013A	O'ring 1.80x1.20 Nitrile ( Rinsing block )	1
FAA055A	O'ring 1.07x1.27 Fluocarbon ( Rinsing block )	1
FAA057A	O'ring 5x1 Nitrile ( Rinsing block )	1
FAA065A	O'ring 6.30x2.40 Silicon ( Reagent syringe )	1
XDA621A	O'ring 30.80x3.60 + washer ( counting + draining syringe 1 & 2 )	3
XDA622A	O'ring 15.54x2.62 + washer ( Reagent syringe )	4
XEA019A	Silicon grease	1

### 2.2. Yearly maintenance kit

Table 3: Yearly maintenance kit XEA486CS

P/N	Designation	Qty
DAJ007A	Optical bench lamp	1
FAA040A	O'ring 12.1x2.7 5DIFF syringe	1
FAA046A	O'ring 2.75x1.6 Coaxial cable	2
FAA064A	O'ring 14.2x1.52 Sampling syringe	2
FAA066A	O'ring 13.1x1.6 Draining chambers	4
FAA067A	O'ring 2.4x1.9 5DIFF syringe	4
GBG275A	Counting head 0.5 joint	4
XEA663A	LMNE flowcell coaxial kit	1
XEA286AS	Waste chamber washer + joint	1
XDA655DS	Sampling needle internal teflon coating	1
JAJ007A	Polyeth. Tape	1,5ML

### 2.3. Pistons maintenance kit

Table 4: Piston kit XEA711CS

P/N	Designation	Qty
GBC030A	Reagent syringe Piston	4
GBC031A	Reagent syringe Piston	1
GBG260A	Piston D=31 Spacer	3
GBG274A	Piston D=31	3
KAA009A	CHC M3x20 Screws	9
GBG169A	Percutor	1

## 2.4. Fitting kit

XEA311 kit includes most common pneumatic and hydraulic parts.

## 2.5. Screws kit

XEA293 kit includes most common screws used in Pentra 80.

## 3. Maintenance procedures



Maintenance and adjustments required for Pentra 80 are divided into procedures according to the concerned assemblies. This should make any update easier as all interventions can be done with the corresponding procedure on its own. Each procedure has to be read entirely before starting intervention.



Procedures must be performed on a clean instrument.  
If the instrument is suspected not to be perfectly clean, perform a concentrated cleaning.  
Disposable gloves should be worn.

### 3.1. Required tools and products

Table 5: Tools and products

Tools\Product Designation	P/n
Barflex	
Clamps	
Cutting pliers	
Distilled water	
Dynamometric screwdriver A300	MAG013A
Dynamometric screwdriver A301	MAG020A
Dynamometric screwdriver A302	MAG019A
Empty sample tubes	
Felt pen	
Flat screwdriver	
Grease for mechanical assemblies	XEA381A
Hexagonal keys	
RBC/PLT Latex	LAD002AS
Liquid soap	
Micropipette tip	
Pair of scissors	
Scalpel	
Silicon grease	LAM004A
Soft tissue	
Syringe 5ml	
Thermometer	
Torx keyx	
Voltmeter	
Gauge set	MAJ004A



## 3.2. Procedures chart table

Procedure P/n	Procedure Designation	Concerns
RAS324	Installation	Unpacking - Working conditions - Instrument installation - First start of the instrument
RAS325	6 month maintenance	Rinsing block - Reagent syringe - Draining syringe 1&2 - Counting syringe - Filter
RAS326	Yearly maintenance	Sampling syringe O'ring - 5DIFF syringe O'ring - Draining chambers O'ring - Optical bench lamp and coax - Diluent reservoir - Counting chambers
RAS327	Piston & Needle kit replacement	Sampling probe & guide replacement - Draining syringe 1&2 - Counting syringe - Reagent syringe
RAS328	Decontamination & Rinse	Instrument decontamination & Rinse
RAS329	Chambers adjustment	Chambers assembly position check and adjustment
RAS330	Probe adjustment	Check and adjustment of the MDSS
RAS331	Main board adjustment	Hgb blank adjustment - RBC\Plt gain adjustment - WBC\Baso gain adjustment - Drain sensors adjustment - Motor current adjustment - Thresholds adjustment
RAS332	Motor board adjustment	Motor board currents check and adjustment
RAS333	Temperature adjustment	Reagent heating coil and thermostatic compartment temperature adjustment
RAS334	Vacuum adjustment	Draining syringe vacuum check - Counting syringe vacuum check - Counting syringe vacuum adjustment
RAS335	Bubbling adjustment	Bubbling adjustment
RAS336	LMNE flowcell adjustment	LMNE flowcell position adjustment
RAS337	LMNE balance adjustment	LMNE balance calibration and forced calibration
RAS338	Tube holder adjustment	Tube holder assembly replacement - Tube holder adjustments - Needle adjustment - Compatible tube list
RAS339	Power supply replacement	Dismantling and replacement of the power supply
RAS340	Check up after intervention	Check up and control of instrument accuracy: Repeatability, Calibration, Control
RAS341	Optical bench dismantling & replacement	Optical bench dismantling, replacement and control
RAS342	Front panel & Covers dismantling	Dismantling of all instrument's panels and covers
RAS343	Internal barcode reader adjustment	Adjustment of internal barcode
RAS344	External barcode reader configuration	Adjustment of external barcode
RAS345	Heater assy replacement	Replacement of the reagent heating system
RAS346	Mixer replacement	Replacement of the mixer
RAS347	Automatic sampler	Loading mechanism check and adjustment - Mixer mechanism check and adjustment - Transfer mechanism check and adjustment
RAS348	Internal PC replacement	Replacement of the computer
RAS349	PC hard disk replacement	Replacement of computer's hard disk
RAS350	PC mother board replacement	Replacement and setup of the computer's mother board
RAS351	PC floppy drive replacement	Replacement of the computer's floppy disk drive

Procedure P/n	Procedure Designation	Concerns
RAS352	PC CD-ROM drive replacement	Replacement of the computer's CD-ROM drive
RAS353	PC touch screen replacement	Replacement of the computer's touch screen
RAS354	Instrument main board replacement	Replacement of the instrument's main board
RAS355	Motor board replacement	Replacement of the motor board
RAS356	Sensors check & adjustment	Check and adjustment of the instrument's switches
RAS357	Save and restore settings	Save and restore analyser and workstation settings

## 3.3. Training department procedure list

Procedure P/n	Procedure Designation	Concerns
RAS324	Installation	Unpacking - Working conditions - Instrument installation - First start of the instrument
RAS342	Front panel & Covers dismantling	Dismantling of all instrument's panels and covers
RAS325	6 month maintenance	Rinsing block - Reagent syringe - Draining syringe 1&2 - Counting syringe - Filter
RAS326	Yearly maintenance	Sampling syringe O'ring - 5DIFF syringe O'ring - Draining chambers O'ring - Optical bench lamp and coax - Diluent reservoir - Counting chambers
RAS327	Piston & Needle kit replacement	Sampling probe & guide replacement - Draining syringe 1&2 - Counting syringe - Reagent syringe
RAS334	Vacuum adjustment	Draining syringe vacuum check - Counting syringe vacuum check - Counting syringe vacuum adjustment
RAS335	Bubbling adjustment	Bubbling adjustment
RAS333	Temperature adjustment	Reagent heating coil and thermostatic compartment temperature adjustment
RAS329	Chambers adjustment	Chambers assembly position check and adjustment
RAS330	Probe adjustment	Check and adjustment of the MDSS
RAS331	Main board adjustment	Hgb blank adjustment - RBC\Pit gain adjustment - WBC\Baso gain adjustment - Drain sensors adjustment - Motor current adjustment - Thresholds adjustment
RAS336	LMNE flowcell adjustment	LMNE flowcell position adjustment
RAS337	LMNE balance adjustment	LMNE balance calibration and forced calibration
RAS346	Mixer replacement	Replacement of the mixer
RAS347	Automatic sampler	Loading mechanism check and adjustment - Mixer mechanism check and adjustment - Transfer mechanism check and adjustment
RAS356	Sensors check & adjustment	Check and adjustment of the instrument's switches
RAS343	Internal barcode reader adjustment	Adjustment of internal barcode
RAS338	Tube holder adjustment	Tube holder assembly replacement - Tube holder adjustments - Needle adjustment - Compatible tube list
RAS332	Motor board adjustment	Motor board currents check and adjustment
RAS348	Internal PC replacement	Replacement of the computer
RAS349	PC hard disk replacement	Replacement of computer's hard disk
RAS350	PC mother board replacement	Replacement and setup of the computer's mother board
RAS351	PC floppy drive replacement	Replacement of the computer's floppy disk drive
RAS352	PC CD-ROM drive replacement	Replacement of the computer's CD-ROM drive
RAS353	PC touch screen replacement	Replacement of the computer's touch screen
RAS357	Save and restore settings	Save and restore analyser and workstation settings
RAS339	Power supply replacement	Dismantling and replacement of the power supply

Procedure P/n	Procedure Designation	Concerns
RAS341	Optical bench dismantling & replacement	Optical bench dismantling, replacement and control
RAS344	External barcode reader configuration	Adjustment of external barcode
RAS345	Heater assy replacement	Replacement of the reagent heating system
RAS354	Instrument main board replacement	Replacement of the instrument's main board
RAS355	Motor board replacement	Replacement of the motor board
RAS340	Check up after intervention	Check up and control of instrument accuracy: Reapetability, Calibration, Control
RAS328	Decontamination & Rinse	Instrument decontamination & Rinse



- Concerns

- Working conditions
- Instrument installation
- First start of the instrument

- Required tools

None

- Required products

None

- Intervention time

1 hour

- Frequency

On request

- Specific kit or consumables

Installation kit: XEA785B



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Working conditions

### 1.1. Environment

The Pentra 80 should be operated in an indoor location only. Operation at an altitude over 3000 meters (9800 feet) is not recommended. Instrument is designed to be safe for transient voltages according to INSTALLATION CATEGORY II and POLLUTION DEGREE 2.

Please ask your *ABX Diagnostics* representative service center for any information about the operating location when it does not comply with the recommended specifications.

### 1.2. Location

The Pentra 80 should be placed on a clean and leveled table or work station. Please note that the Pentra 80, printer and reagents weigh approximately 40 kilograms (88 lbs). Avoid exposure to sunlight. Proper ventilation requires that a space of at least 20 cm (8 inches) must be left behind the instrument.

### 1.3. Grounding

Proper grounding is required. Check that the wall ground (earth) plug is correctly connected to the laboratory grounding electricity installation.

If there is no ground then use a ground stake. Current electricity Standards must be applied.

### 1.4. Humidity and temperature conditions

The Pentra 80 must function between 16 to 34°C (61 to 93°F). Maximum relative humidity 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F). If it is kept at a temperature of less than 10°C (50°F), the instrument should be allowed to sit for an hour at the correct room temperature before use.

### 1.5. Electromagnetic environment check

The Pentra 80 has been designed to produce less than the required level of electromagnetic interferences in order to operate in conformity with its destination. The electromagnetic interferences caused by the Pentra 80 are limited to a level allowing the correct operation of other instruments in conformity with their destination.

In case of problems, check that the instrument is not placed in proximity of electromagnetic fields, or short wave emissions (radars, X-rays, scanner, etc...).

### 1.6. Environment protection

Used accessories and consumables must be collected by a laboratory specialized in elimination and recycling of this kind of material according to the legislation.

## 2. Instrument Installation

### 2.1. Unpacking

Unpack the instrument carefully.

After unpacking check that all of the parts from the package list are present.

Table 1: Package list

Part Number	Qty	Designation
XEA785B	1	Installation kit Pentra 80
XBA453A	1	Barcode reader
GBD072A	4	Lifting handles
GBL0280	10	Rack 10 vials 13x82
CBK044A	1	Computer Mouse
GBL0250	1	Keyboard drawer
7005056	1	Cardboard Box
7001020	1	20L container with LAU015A sticker
HAN524A	1	Mouse Carpet (only for Pentra XL80)

Table 2: Installation Kit XEA785B

Part Number	Qty	Designation
DBE027A	2	Wire guide
DBH001A	3	Tyrap LA=2,4 L=92
DBH002A	3	Tyrap LA=3,6 L=140
DBK003A	1	Flat cable adhesive support
DBK009A	1	Adhesive support D=9mm
EAB021A	1	«Y» connector Diam.=3mm
EAB026A	1	«Y» connector Diam.=2,5mm
EAB033A	1	«T» connector ø1,6mm T410-6
EAB035A	1	«T» connector ø2,3mm T220-6
EAC010A	2	Female luer connector l=3
EAC019A	1	Male luer connector l=3
EAE005A	2m	Tygon tube ø1,02mm (0,040")
EAE006A	2m	Tygon tube ø1,295mm (0,051")
EAE007A	2m	Tygon tube ø1,52mm (0,060")
EAE008A	2m	Tygon tube ø2,06mm (0,081")
EAE011A	2m	Cristal tube 3x6
EAE028A	2m	Cristal tube 4x6
EAE034A	2m	Tygon tube ø2,54mm (0.100")
EBB059AS	1	Filter support Swinnex 25 mm
FAA013A	1	O'ring 1,8x1,2
FAA055A	1	O'ring 1.07x1.27 fluocarbon
FAA057A	1	O'ring 5x1
FBH018A	1	Housse Pentra 80
FBL001A	1	Rubber cap 2 holes
GAK302A	3	Bottle cap
GBG138A	1	1/4 turn door key
GBG145A	1	Reagent straw stopper ø20
GBG155A	1	Capsule ø25
JAJ011A	1	Box 33x25x08
GBG245A	3	Reagent straw stopper ø28
MAB002A	1	Allen bent key 2,5mm
MAB003A	1	Allen bent key 1,5mm

Table 2: Installation Kit XEA785B

Part Number	Qty	Designation
MAB018A	1	Allen bent key 3mm
MAB090A	1	Torx bent key T10
XDA483B	1	3V liquid valve (without self)
XDA621A	1	O'ring 30,8x3,8 + Washer
XDA692A	1	Diluent input tubing
XEA018A	1	Diluent straw Lg=360mm
XEA019A	1	Grease
XBA322B	1	Waste straw
HAX0053	1	Rack label Type A - 1 to 20
HAX0054	1	Rack label Type B - 1 to 20
DAJ007A	1	Lamp 20W 9.5V
MAB001A	1	Allen bent key 2mm
HAN516A	2	Touch screen pen



## 2.2. Transport and installation

To operate the instrument correctly, install it in a place satisfying the following conditions:

- Place where the instrument and reagents are not thermally affected by direct sunlight and intense radiant heat.
- Place where it is not exposed to water or vapor.
- Place where it is flat and free from vibration or shock.
- Place where an independent power receptacle can be used.
- Use a receptacle different from the one used by a device that easily generate noise such as a centrifuge, etc...
- Provide a space of at least 10 cm at the back of the instrument for arranging the power cable and pipes.

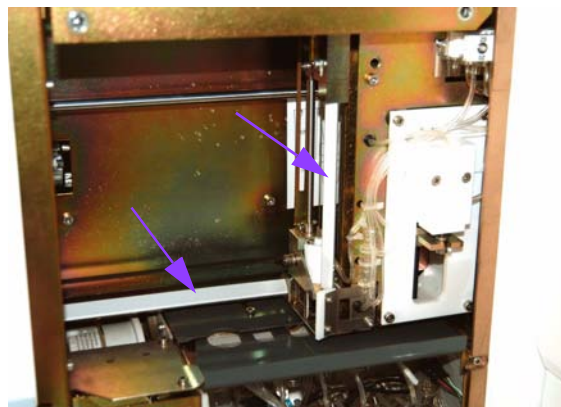


Install instrument lifting handles in their location (See “Lifting handles installation”, page 5), make sure they are correctly secured, lift the instrument using the four handles up on to the installation bench.



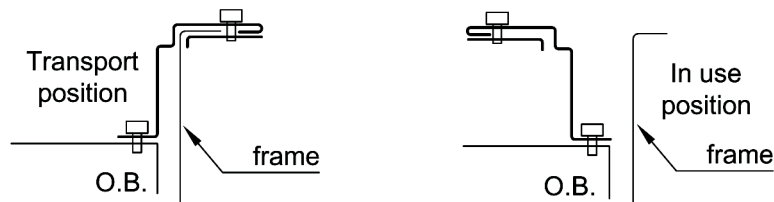
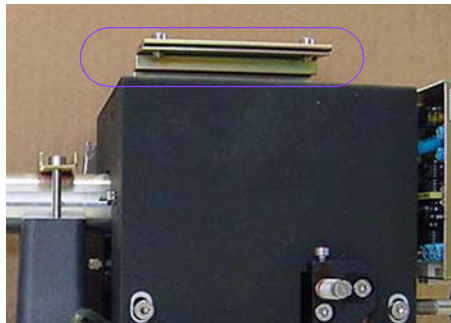
Diag.1 Lifting handles installation

Open the thermic panel (righthand side of the instrument).  
Remove the plastic rails retaining the carriage (See “Plastic rails”, page 5).



Diag.2 Plastic rails

Remove the Left panel door then the Upper cover to access to the optical bench.  
For transport, the optical bench is fixed on the frame with holding plates. They have to be removed before starting the instrument and fixed as shown on next diagram (See “Holding plates”, page 6).



Diag.3 Holding plates

### 2.3. Electrical & Computer connections

Check that the power supply module voltage of the instrument corresponds to the nominal voltage supply of the laboratory and the country.

Connect the power supply cable (See “Electrical connections”, page 6)

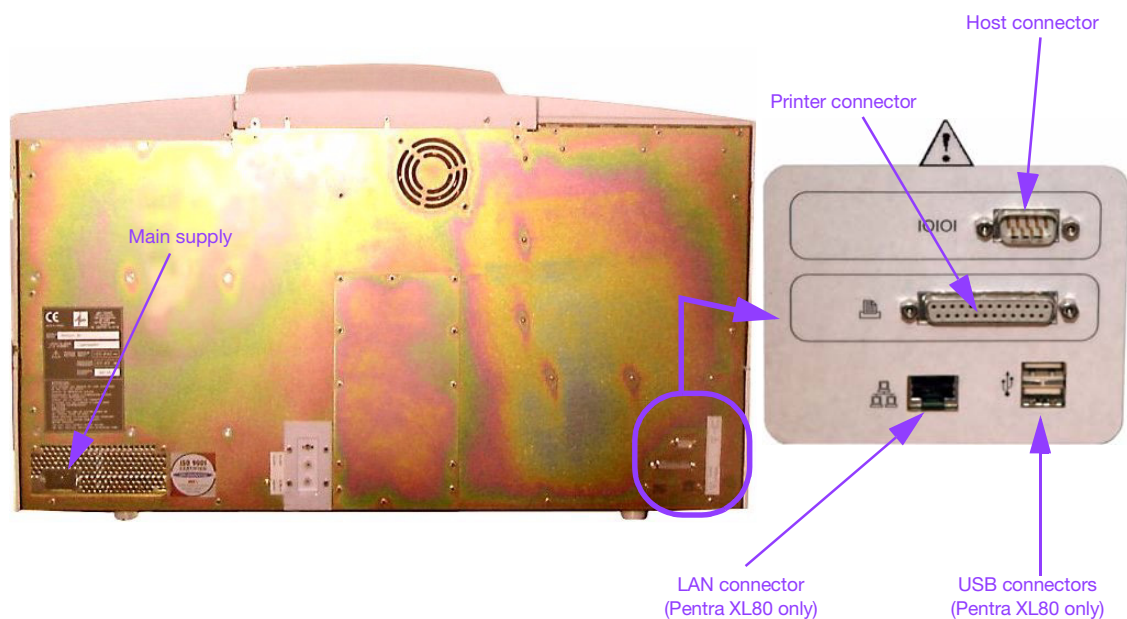
Connect the printer (See “Electrical connections”, page 6)



Power requirements:

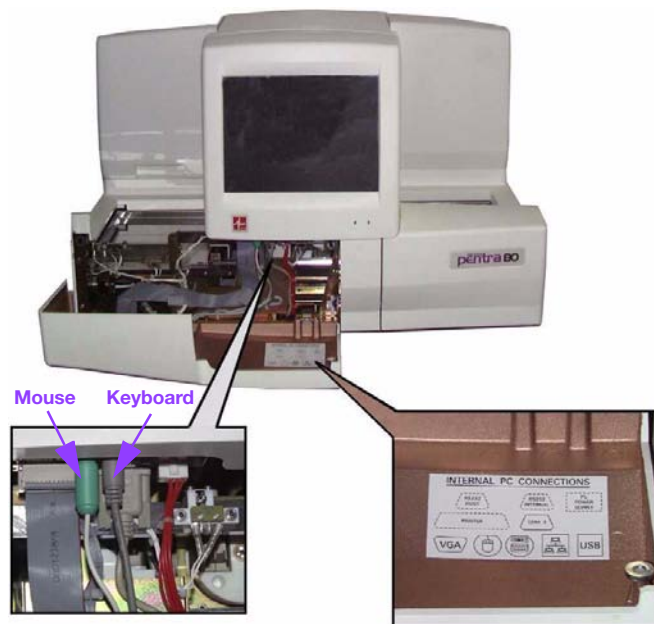
Analyzer: 250W

Printer (OKI 4200): 350W



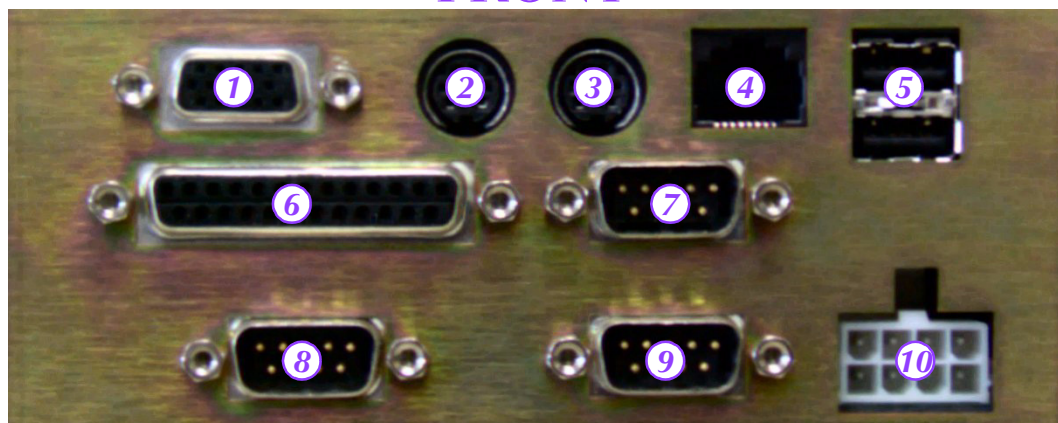
Diag.4 Electrical connections

Connect computer's devices: Mouse, Keyboard, Barcode reader (See “Computer's connections”, page 7) and (See “Computer connectors”, page 7).



Diag.5 Computer's connections

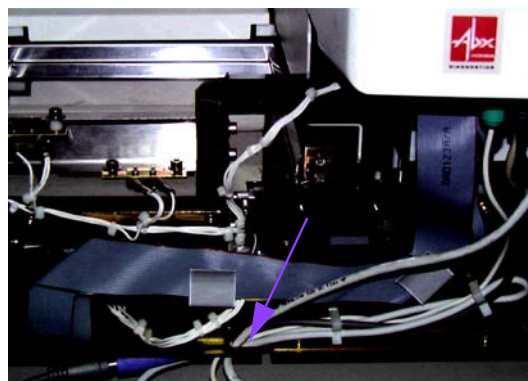
## FRONT



- |             |                                  |
|-------------|----------------------------------|
| 1- VGA      | 6- Printer                       |
| 2- Mouse    | 7- COM3: External Barcode reader |
| 3- Keyboard | 8- COM2: Labo link               |
| 4- LAN      | 9- COM1: To Mother Board         |
| 5- USB      | 10- Power                        |

Diag.6 Computer connectors

Route the computer's wiring under the frame of the Pentra 80 (See "Computer's wiring", page 7).



Diag.7 Computer's wiring

## 2.4. Reagents installation

Use «Luer» connectors, straws and stoppers supplied with the installation kit to connect integrated reagents, diluent and wastes.

Bottles and container locations (See “Reagent location”, page 8):



- 1- ABX Lyse
- 2- ABX Basolyse II
- 3- ABX Eosinofix
- 4- ABX Cleaner
- 5- ABX Diluent
- 6- Waste container

Diag.8 Reagent location



Risk of erroneous results if diluent container is installed further than 80 cm (31,5 in.) bellow the instrument.

Diluent input tubing: Cristal 3x6 / 2 meters (80 in.) maximum

Waste output tubing: Cristal 4x6 / 2 meters (80 in.) maximum

## 3. First start of the instrument

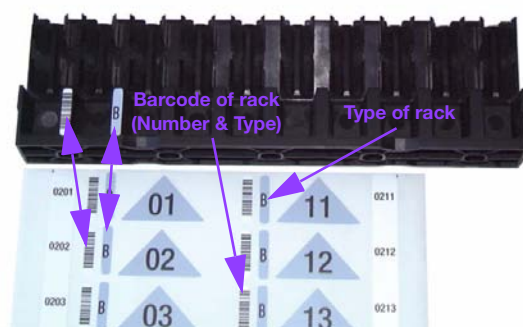
Start the instrument (ON/OFF Switch is on the righthand side of the instrument).

Wait for computer's initialization. When logon window is opened: Log as «administrator», password «XXXXX» (Beware to the type of the keyboard used: Qwerty or Azerty).

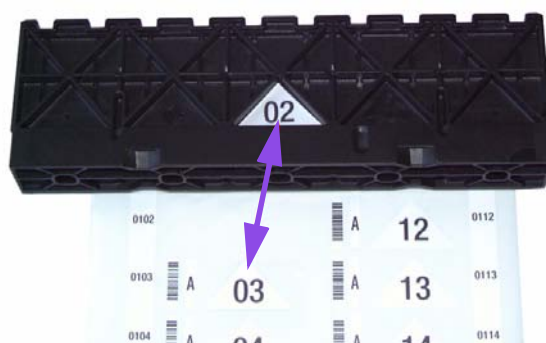
When Pentra 80 is started it initializes its mechanical components, wait until the end of the initialization.

### 3.1. Racks

The Pentra 80 racks are identified by means of barcode labels. Prepare 2 or 3 racks to use during installation. These labels have to be placed on racks as follows:



Diag.9 Rack's labels front side



Diag.10 Rack's labels rear side

### 3.2. Check keyboard setup

Check the type of the keyboard used (Qwerty or Azerty). From window **Input Locales**, menu: **Settings\System\Local Settings**, press **Edit** button then **Change Input Locales** button.

### 3.3. Check Date\Time

Check and if necessary adjust Date and Time. From window **Date/Time**, menu: **Settings\System\Local Settings**, press **Edit** button then **Change Date/Time** button. Adjust Date & Time then press **Validate** button to save changes.

### 3.4. Check printer configuration

Check the printer used by the system is correctly defined.  
Enter menu: **Settings\System\Printer**, press **Edit** button then **Printer Properties** button.  
Check the name of the printer used in the **Name** field of the **Print** window. If necessary select the right printer then press **Validate** button.

### 3.5. Prime reagents

Prime reagent using barcode reader to enter lot number and to update expiry date automatically, menu: **Status**.

Run a whole priming of all reagents to be sure of a correct priming, menu: **Service\Super User\Hydraulic\Prime cycles\All reagents**.

### 3.6. Mechanic check

Make sure all the panels are fitted on the instrument.

Check in menu: **Service\Super User\Mechanical\Check Sensors**, that all the sensors are green.  
Check rack is well transferred to the reception tray, menu: **Service\Technician\Gains\Sampler adjust**. then press **Check Rack Transfer Moving**.

Check MDSS is correctly adjusted, menu: **Service\Technician\Gains\M.D.S.S. Adjustment**, press **Check Needle Position**. The probe must be as shown:



*Diag. 11 MDSS Adjustment*

Close the thermal door (righthand side of the instrument)

Check Hgb blank value, menu: **Service\Technician\Measurement\Gain Adjustment**, press **Hgb Blank Adjustment**. If necessary adjust between ground and **TP1** with **R248** potentiometer on main board, the Hgb blank voltage to **4.7V ±0.02V**.

### 3.7. Startup

Run a Startup cycle.

### 3.8. Repeatability

Check repeatability running 10 analyses with on the same blood sample.

From menu: **Quality Assurance\Within Run**, run 10 consecutive analyses.

### 3.9. Calibration

Perform a calibration of the instrument. Select and enter Calibrator lot parameters. If necessary force calibration to enter the new coefficients.

### 3.10. Control

Run several controls to validate the calibration. When using DIFFTROL control blood, use the floppy disk to update lot parameters.

Select the **Reserved** box to link the lot number to QC results for further analyses.

### 3.11. Config. save and print

After installation is completed, archive and print instrument setup by following procedure RAS357 «Save and restore settings».





- Concerns

- Rinsing block
- Reagent syringe
- Draining syringe 1
- Draining syringe 2
- Counting syringe
- Instrument & Filter cleaning

- Required tools

- Hexagonal Keys
- Dynamometric screw drivers A302, A301, A300
- Cutting pliers
- Flat screw driver
- Philips screw drivers
- Torx keys

- Required products

Minoclair

- Intervention time

2 h.

- Frequency

See maintenance table

- Specific kit or consumables

6 month maintenance kit: XEA710BS



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

Table 1: 6 Month maintenance kit XEA710BS

P/N	Designation	Qty
FAA013A	O'ring 1.80x1.20 Nitrile ( Rinsing block )	1
FAA055A	O'ring 1.07x1.27 Fluocarbon ( Rinsing block )	1
FAA057A	O'ring 5x1 Nitrile ( Rinsing block )	1
FAA065A	O'ring 6.30x2.40 Silicon ( Reagent syringe )	1
XDA621A	O'ring 30.80x3.60 + washer ( counting + draining syringe 1 & 2 )	3
XDA622A	O'ring 15.54x2.62 + washer ( Reagent syringe )	4
XEA019A	Silicon grease	1



This procedure must be performed on a clean instrument. If the instrument is suspected not to be perfectly clean, perform a concentrated cleaning.

Disposal gloves and white coat must be worn by the operator.

Local or national regulations must be applied in all operations.

## 1. Rinsing block

O' ring replacement ( 1xFAA013A, 1xFAA055A & 1xFAA057A ).

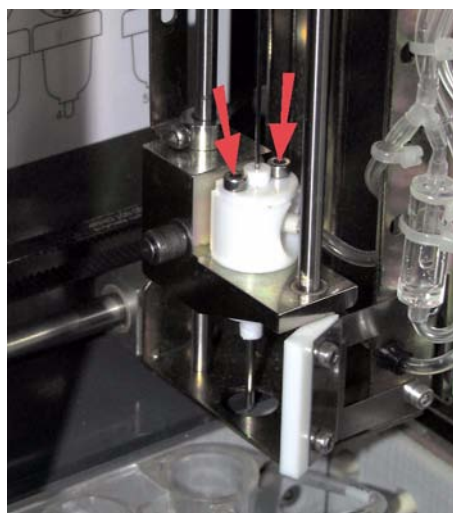
Switch off the instrument and disconnect power supply cable.

Open the right side door.

Move the carriage to access to the rinsing block.

Remove the 2 rinsing block screws (See Diag.1 "[rinsing block](#).", page 2).

Lift the locker (See Diag.2 "[locker](#).", page 3) to free the probe and remove the rinsing block.



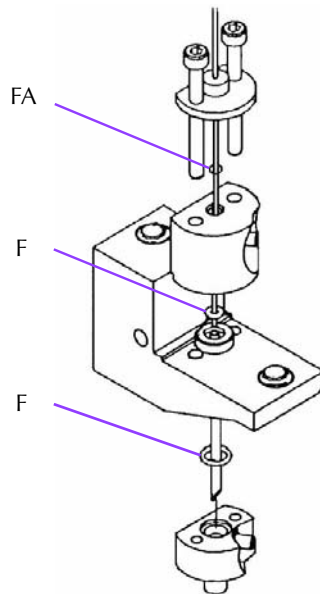
Diag.1 rinsing block.





Diag.2 locker.

Use a small amount silicon grease with FAA057A O'ring (See Diag.3“O'ring position.”, page 3) and replace the O'rings from the rinsing block



Diag.3 O'ring position.

Reassemble in reverse order.



Do not tight too much the rinsing block screws.

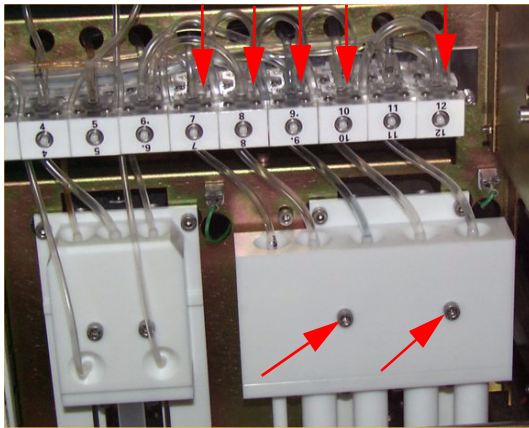
## 2. Reagent syringes

O'ring replacement (1xFAA065A& 4xXDA622A).

Switch off the instrument and disconnect power supply cable.

Remove cover (See RAS342 procedure).

Disconnect the following tubes: (See Diag.4“Reagent syringe”, page 4).



Diag.4 Reagent syringe

- valve 7 inlet 3.
- valve 8 inlet 3.
- valve 9 inlet 3.
- valve 10 inlet 3.
- valve 12 inlet 3.

Unscrew the 2 fixation screws and remove carefully the reagent syringes (See Diag.4“[Reagent syringe](#)”, page 4).

Push several times the piston over the waste container to drain the syringes.



The thickness of the washer is matched to each O'ring thickness. For this reason, keep the O'ring and the washer together.  
Lyse piston O'ring ( small one ) had no washer.

On a piece of absorbant paper open the reagents syringe (9x CHC M3x12 screws, 2x FX M3x12 screws).

Replace all O'rings and washers by new one from the 6 month maintenance kit.

Use one drop silicon grease in between 2 fingers to lubricate the O'rings (See Diag.5“[Reagent syringe open.](#)”, page 4).



Diag.5 Reagent syringe open.

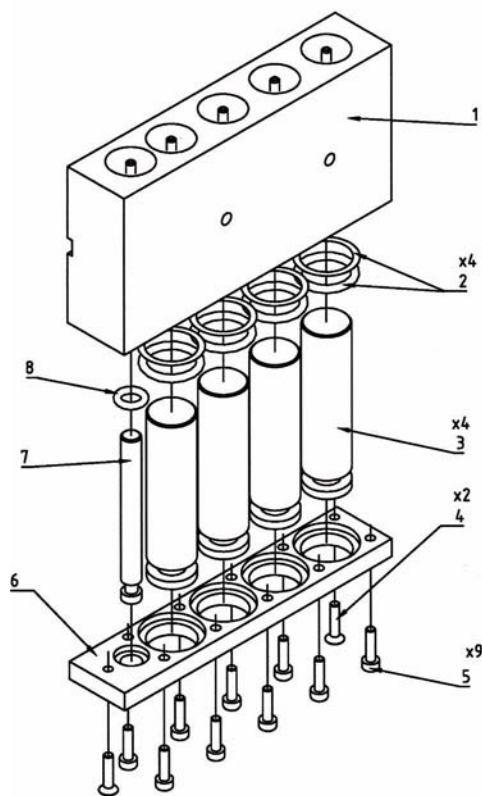


#### TIGHTENNING TORQUES

9x CHC M3x12 :  
400mN.m (56.8Ozf.in)  
2x FX M3x12 :  
400mN.m (56.8Ozf.in)

Reassemble in reverse order.

Use a dynamometric screw driver to tighten the syringe (See Diag.6“[Reagent syringe view.](#)”, page 5).



Diag.6 Reagent syringe view.

- 1\_ Reagent syringe body (GBG033a).
- 2\_XDA622A.
- 3\_Piston ( GBC030A).
- 4\_FX M3x12 screws.
- 5\_CHC M3x12 screws.
- 6\_ Reagent syringe bottom plate (GBG034A).
- 7\_Hgb lyse reagent piston (GBC031A).
- 8\_O'ring (FAA065A).



XDA622A = O'ring (FAA063A) + Washer (GBG149A).

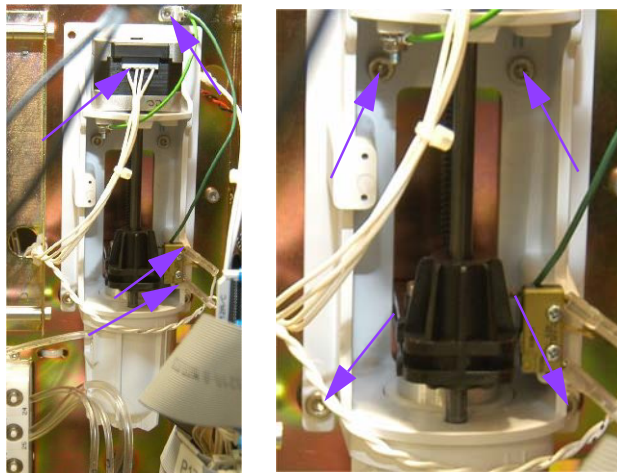
### 3. Draining & counting syringes

#### 3.1. O' ring replacement on draining syringe 1:

Switch off the instrument and disconnect power supply cable.

Remove cover (See RAS342 procedure).

Disconnect electrical connectors on the syringe then unscrew the 4 CHC M4x16 syringe screws, just few turns to release the silent blocks (See Diag.7“[Draining 1 syringe dismantling.](#)”, page 5).



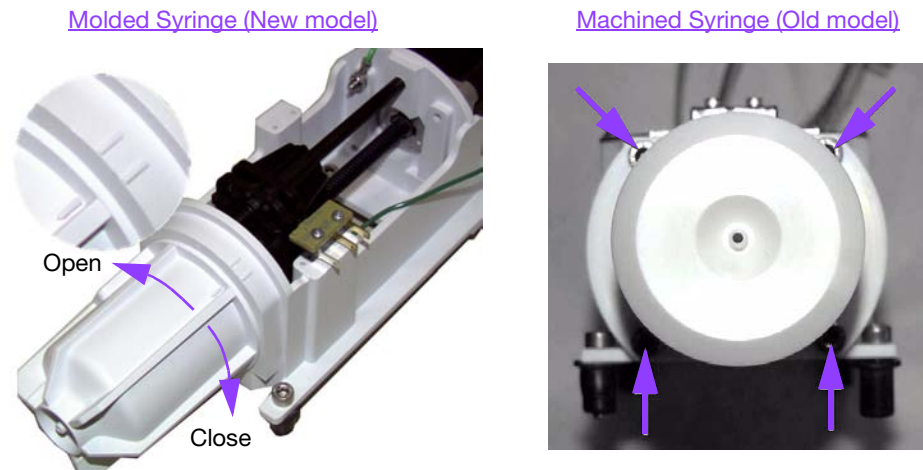
Diag.7 Draining 1 syringe dismantling.

Put a piece of absorbant paper under the syringe and disconnect all the tubes from the syringe.  
Remove the syringe.

Drain the syringe pushing the piston nut up and down several times.

Open the syringe:

- 4x CHC M4x16 screws on old model
- Rotation of the Syringe Body on new model ( See Diag.8“[Draining 1 syringe opening.](#)”, page 6).



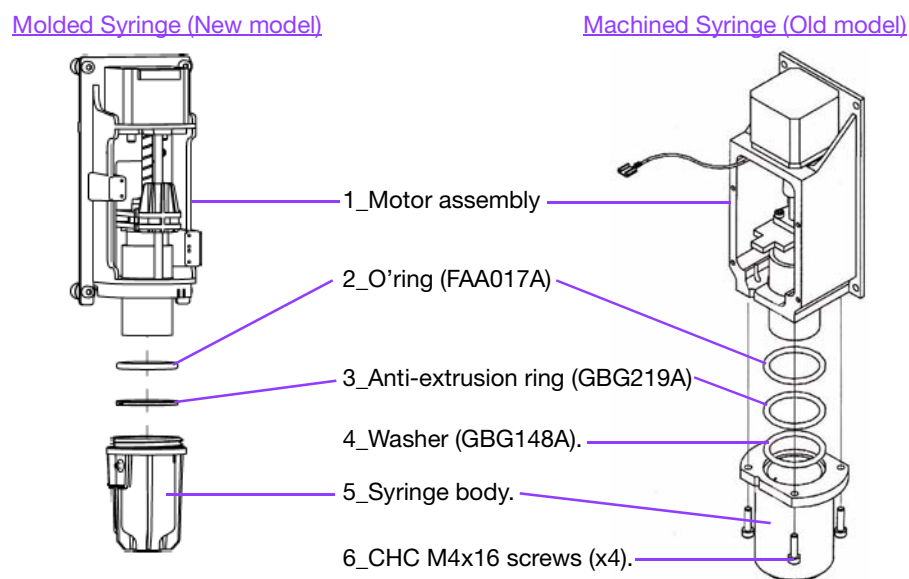
Diag.8 Draining 1 syringe opening.

Replace the O'ring by the new one from the 6 month maintenance kit.

Use one drop silicon grease in between 2 fingers to lubricate O'ring and piston.

Make sure the washer (4) is present on the old model then reassemble in reverse order (See Diag.9“[Draining 1 syringe view](#)”, page 6).

Chamber body of the new syringes is directly screwed on the motor block. When the body is reinstalled on the motor block, it has to be rotated until the mark on the body is located between the two marks of the motor block.



Diag.9 Draining 1 syringe view



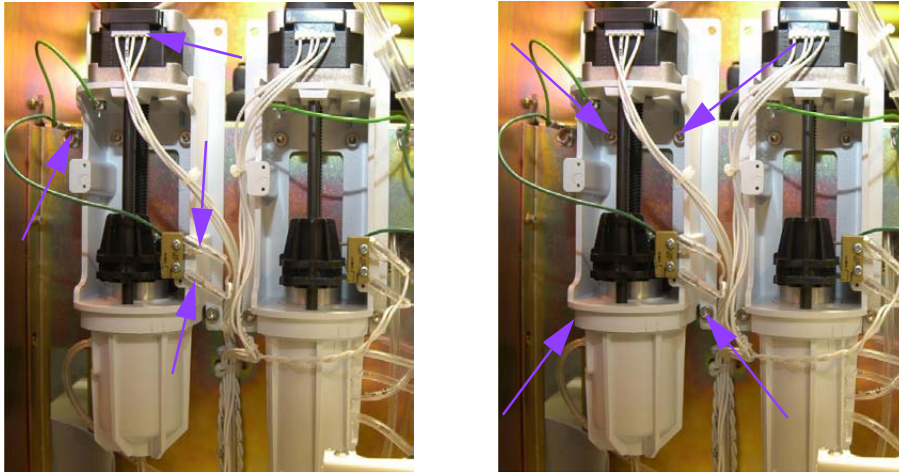
O'ring (FAA017A) + Washer (GBG148A) = XDA621A.

### 3.2. O' ring replacement on draining syringe 2.

Switch off the instrument and disconnect power supply cable.

Remove cover (See RAS342 procedure).

Disconnect electrical connectors on the syringe then unscrew the 4 CHC M4x16 syringe screws, just few turns to release the silent blocks (See Diag.10 "[Draining 2 syringe dismantling](#).", page 7).



Diag.10 Draining 2 syringe dismantling.

Follow the same procedure than for Draining 1 syringe to replace O'ring (See above).

### 3.3. O' ring replacement on counting syringe.

Switch off the instrument and disconnect power supply cable.

Remove cover (See RAS342 procedure).

Disconnect electrical connectors on the syringe then unscrew the 4 CHC M4x16 syringe screws, just few turns release the silent blocks (See Diag.11 "[Counting syringe dismantling](#)", page 7).



Diag.11 Counting syringe dismantling

Follow the same procedure than for Draining 1 syringe to replace O'ring (See above).



#### 4. Instrument cleaning.

##### Concerned assemblies

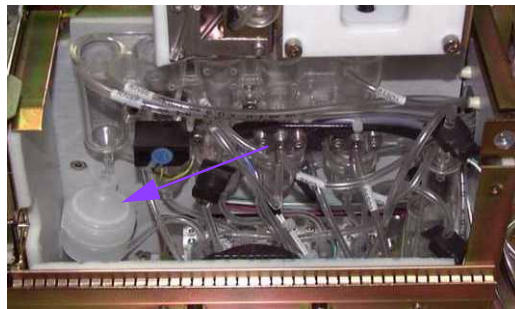
All the thermostated compartment.  
Outer surfaces of the instrument (perpex, covers, reagent locations....).  
Waste connector plug.  
Liquid valve push button.  
Assemblies close to the needle.  
Tube holder assembly.  
Overflow trays.

##### Procedure

Dilute the 12°cl bleach to 1 part of bleach for 4 of deionize water (1/5).  
Instrument environment must be cleaned.  
No sponge, nor cloth must be used. Only absorbant paper, thrown after use in contamination bins, have to be used. For small or sensitive assemblies, use accurate drier papers.  
All assemblies suspected to have been in contact with biohazardous material must be disinfected with diluted bleach (the stainless steel must be bleached below 30°Celsius).  
Blood stains or salt marks must be cleaned with spray detergent first.

##### Filter

Clean the filter under the «rinse» chamber (See Diag.12“filter.”, page 8) from the pieces of cap rubber.



Diag.12 filter.

Reinstall all the assemblies and setup the instrument back to its initial configuration.



- Concerns

- Samplig needle replacement
- Sampling syringe: O'ring replacement
- 5DIFF syringe: O'ring replacement
- Draining chambers: O'ring replacement
- Optical bench: Lamp & LMNE coaxial replacement
- Diluent reservoir
- Counting chambers

- Required tools

- Hexagonal keys
- Dynamometric screwdriver A302, A301, A300
- Cutting pliers
- Flat screwdriver
- Philips screw driver
- Tork keys

- Required products

- Minoclair
- RBC\Plt Latex
- Acetone

- Intervention time

2h.

- Frequency

See maintenance table

- Specific kit or consumables

Yearly maintenance kit: XEA486CS



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Yearly maintenance kit

Table 1: Yearly maintenance kit XEA486CS

P/N	Designation	Qty
DAJ007A	Optical bench lamp	1
FAA040A	O'ring 12.1x2.7 5DIFF syringe	1
FAA046A	O'ring 2.75x1.6 Coaxial cable	2
FAA064A	O'ring 14.2x1.52 Sampling syringe	2
FAA066A	O'ring 13.1x1.6 Draining chambers	4
FAA067A	O'ring 2.4x1.9 5DIFF syringe	4
GBG275A	Counting head EPO 0.5 joint	4
XEA663A	LMNE flowcell coaxial kit	1
XEA286AS	Waste chamber washer + joint	1
XDA655DS	Sampling needle internal teflon coating	1
JAJ007A	Polyeth. Tape	1,5ML



This procedure must be performed on a clean instrument. If the instrument is suspected not to be perfectly clean, perform a concentrated cleaning.

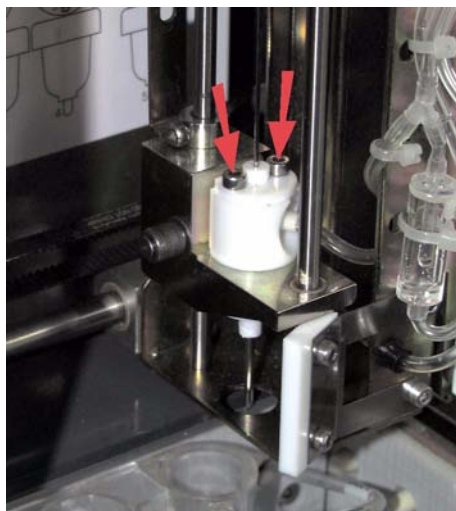
## 2. Sampling needle replacement (XDA655DS)

Switch off the instrument and disconnect the power supply cable.

Open the righthand side door.

Move the carriage to access to the rinsing block.

Remove the two rinsing block screws then lift the locker to free the needle (See Diag.1 “Needle dismantling”, page 2).



Diag.1 Needle dismantling

Replace the needle then reassemble in reverse order.



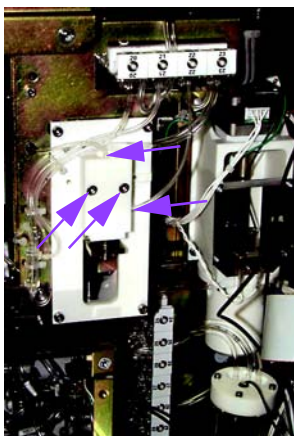
### 3. Sampling syringe O'ring replacement (2xFAA064A)

Switch the instrument off and disconnect power supply cable.

Open the righthand side door.

Move the carriage to access to the sampling syringe.

Disconnect the tubes from the sampling syringe and unscrew the 2 fixation screws (See Diag.2 "Sampling syringe dismantling", page 3).



Diag.2 Sampling syringe dismantling

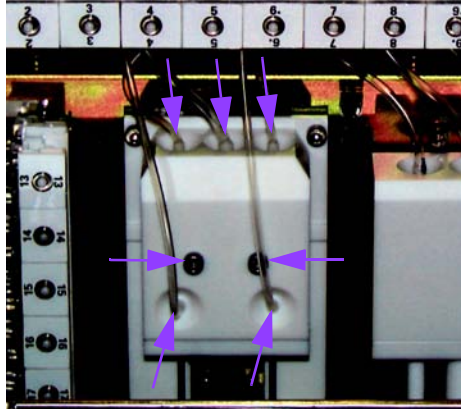
Open the syringe (Unscrew the 3 FX M3x12 screws See Diag.2 "Sampling syringe dismantling", page 3).

Replace both O'ring joints (Use one drop of silicon grease between 2 fingers to lubricate O'rings). Reassemble in reverse order, Sampling syringe screws tightening torque: 400 mN.m (56.8 Ozf.in).

#### 4. 5DIFF syringe O'ring replacement (FAA040A & 4xFAA067A)

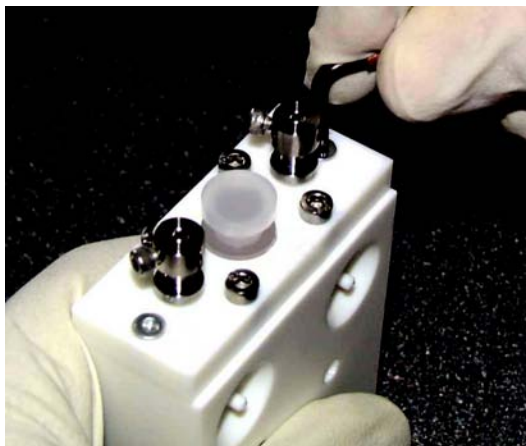
Open the lefthand side panel to access to the 5DIFF syringe.

Gently disconnect the tubes from the 5DIFF syringe and unscrew the 2 fixation screws (See Diag.3 "5DIFF syringe dismantling", page 4).



Diag.3 5DIFF syringe dismantling

Open the syringe (Unscrew the 2xFX M3x12 & the 4xCHC M3x12 screws See Diag.4 "5DIFF syringe screws", page 4).



Diag.4 5DIFF syringe screws

Replace all the O'rings (Use one drop of silicon grease between 2 fingers to lubricate O'rings).  
Reassemble in reverse order, 5DIFF syringe tightening torque: 400 mN.m (56.8 Ozf.in).

## 5. Optical bench lamp replacement (DAJ007A)

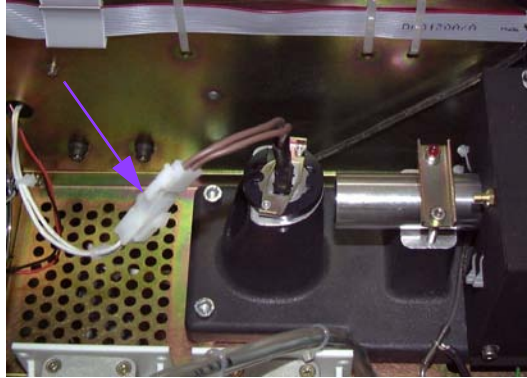


Before dismantling optical bench lamp make sure it is cold.

Do not touch lamp bulb with the fingers, use a piece of cloth or paper to manipulate the lamp.

Open the cover (see RAS342 Front panel & Covers dismantling procedure for further details).

Disconnect the lamp supply (See Diag.5 “Optical bench lamp disconnection”, page 5).



Diag.5 Optical bench lamp disconnection

Unscrew the lamp fixation screws for few turns to release the lamp (See Diag.6 “Optical bench lamp dismantling”, page 5).



Diag.6 Optical bench lamp dismantling

Turn the lamp and remove it.

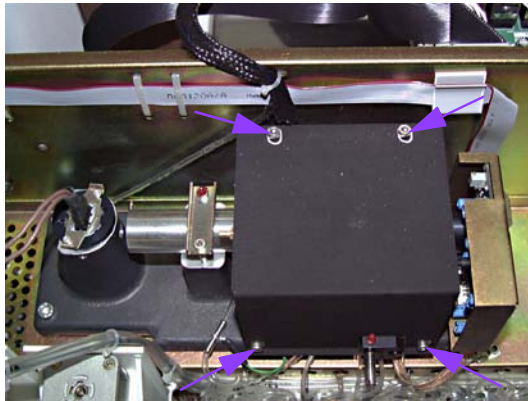
Change the lamp.

Put back the fixation system and block the screws.

Reconnect the lamp supply.

## 6. LMNE flowcell coaxial replacement (XEA663A)

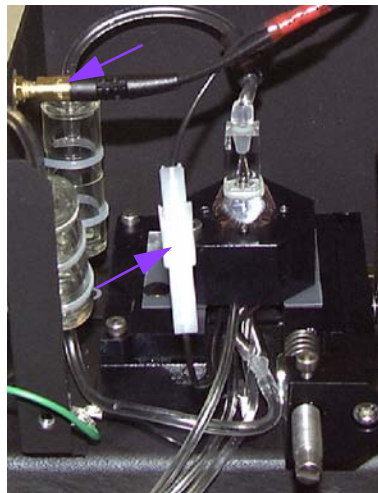
Open the optical bench cover (See Diag.7 “Optical bench cover dismantling”, page 6).



Diag.7 Optical bench cover dismantling

Disconnect coaxial connector from the Optical bench board (See Diag.8 “Coaxial disconnection”, page 6).

Disconnect the coaxial from the LMNE flowcell (See Diag.8 “Coaxial disconnection”, page 6).



Diag.8 Coaxial disconnection

Disconnect both tube from the «T» connector (few diluent drops may leak, See Diag.9 “«T» disconnection”, page 6)



Diag.9 «T» disconnection

Replace the coaxial cable.

## 7. Optical bench lamp 6V voltage check

Run a **Rinse cytometer** cycle to get rid of air bubbles stuck to the inner optical surfaces.

From menu **Service\Menu Super User\Hydraulic\Clean cycle\Rinse cytometer ()**.

Check that the flowcell contains no or just a very few air bubbles.

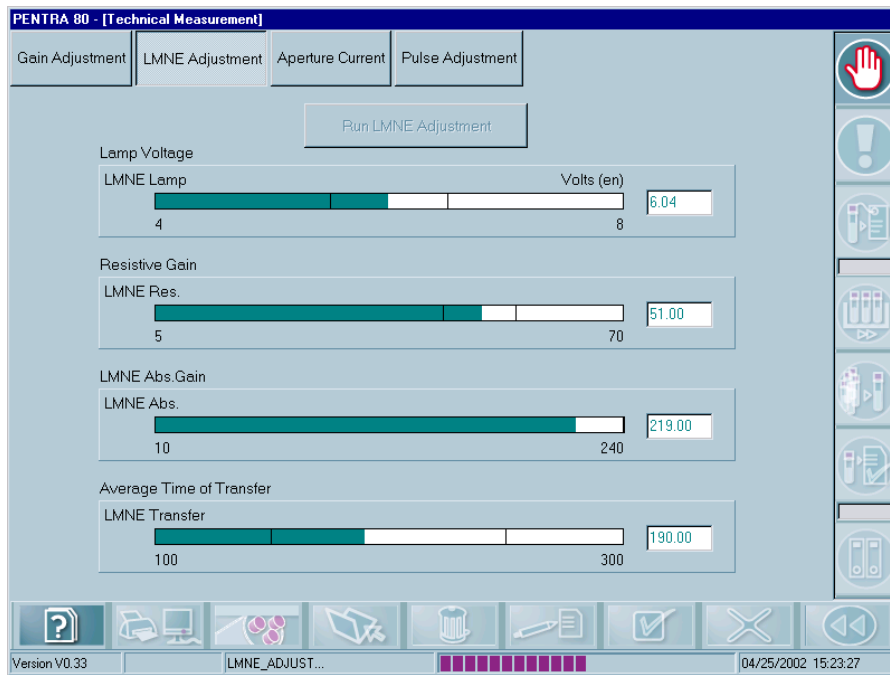
From menu **Service\Menu technician\Measurement\LMNE adjustment**

Click on **Run LMNE Adjustment** button.



Mix the RBC/PLT latex thoroughly.

Closed tube holder when the message **Please sample LATEX** appears.



Diag.10LMNE lamp 6V adjustment

Check LMNE lamp voltage is  $6V \pm 0.5V$

Check as well the other values are within the acceptable range.

Table 2: optical bench adjustment target values

Parameter	Target	Range
LMNE Lamp	6.00V	5.50 to 6.50
LMNE res.	50	45 to 55
LMNE Abs.	170	Set to maximum
LMNE Transfer	200ms	150 to 250

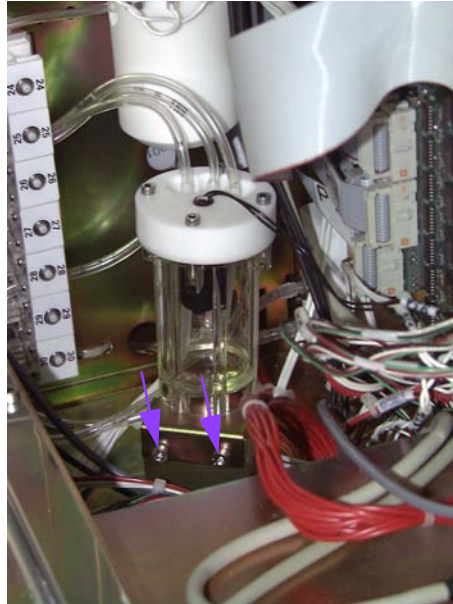
## 8. Diluent reservoir Joint & Washer replacement (XEA286AS)

From menu: **Services\Super User Menu\Hydraulic\Unprime Cycle** run the **All** option to drain the chambers and the diluent reservoir.

Remove the righthand side panel and the mother board cover from the instrument (See procedure RAS342 Front panel & Covers dismantling for further details).

Remove the white vertical plastic mother board protection.

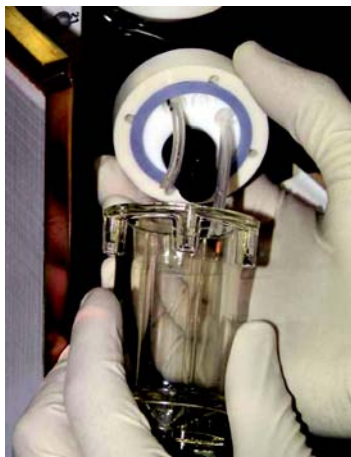
Loosen the 2 diluent reservoir fixation screws to free the diluent reservoir (See Diag.11 “Diluent reservoir dismantling”, page 8).



Diag.11 Diluent reservoir dismantling

Open the diluent reservoir without disconnecting its tubing (4 screws on the top).

Locate the new joint and washer against the reservoir top (See Diag.12 “Diluent reservoir assembling”, page 8).



Diag.12 Diluent reservoir assembling



Locate the top part of the reservoir to have the both tube turned in front of the diluent reservoir.  
Top screws tightening torque: 120 m.Nm (17 Ozf.in).

Screw the 4 diluent reservoir screws according to the tightening torque above.

If the tube under the reservoir body has been disconnected, connect it before installing back the diluent reservoir in its location.

Install the diluent reservoir in its location and block the screws.

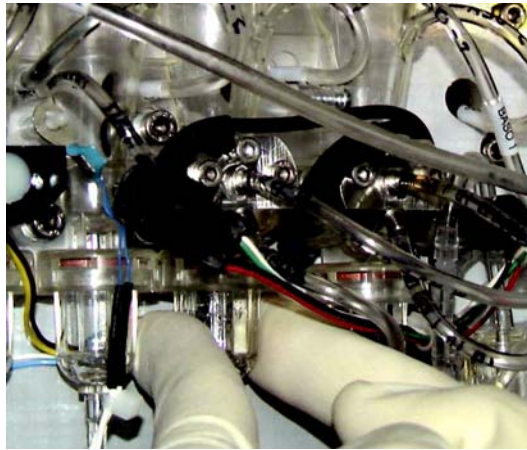


## 9. Draining chambers O'ring replacement (4xFAA066A)

Make sure the chambers are drained, if not run a **Services\Super User Menu\Hydraulic\Unprime Cycle\All** command to drain the chambers.

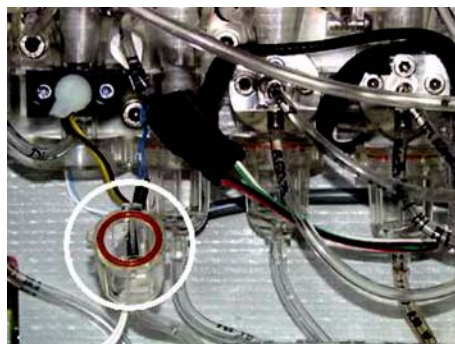
Put a piece of absorbant paper or cloth under the chambers assembly.

Turn gently the chamber's bottom between 2 fingers (See Diag.13 "[Draining chamber dismantling](#)", page 9).



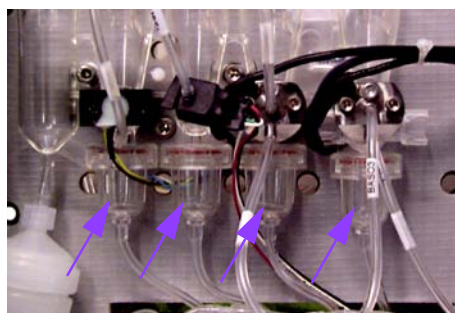
Diag.13 Draining chamber dismantling

Replace the O'ring (See Diag.14 "[Draining chamber O'ring replacement](#)", page 9).



Diag.14 Draining chamber O'ring replacement

Repeat for all the chambers the same operation (See Diag.15 "[Draining chambers](#)", page 9).



Diag.15 Draining chambers

## 10. Counting heads RBC\WBC coaxial cable O'ring replacement (2xFAA046A)

Make sure the chambers are drained, if not run a **Services\Super User Menu\Hydraulic\Unprime Cycle\All** command to drain the chambers.

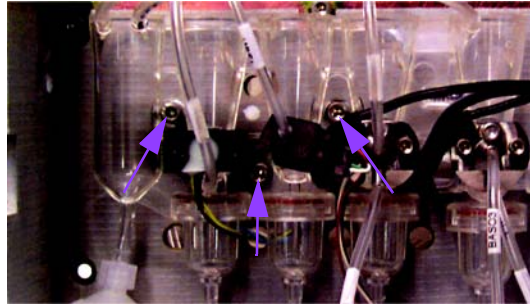
Switch the instrument off.

Put a piece of absorbant paper or cloth under the chambers assembly.

Record the tube positions before dismantling the chambers assembly.

Disconnect chamber's tubes except for the wastes.

Unscrew the 3 screws from the chambers assembly (See Diag.16 "[Draining chambers assembly dismantling](#)", page 10).



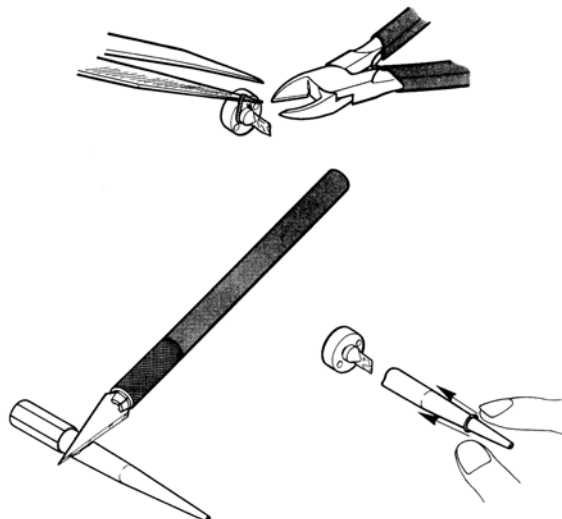
Diag.16 Draining chambers assembly dismantling

Dismantle the electrode loosening the 2 fixation screws (See Diag.17 "[Electrode dismantling](#)", page 10).



Diag.17 Electrode dismantling

Use a previously cut micropipette tip to replace the electrode O'ring (See Diag.18 "[Electrode O'ring replacement](#)", page 10).



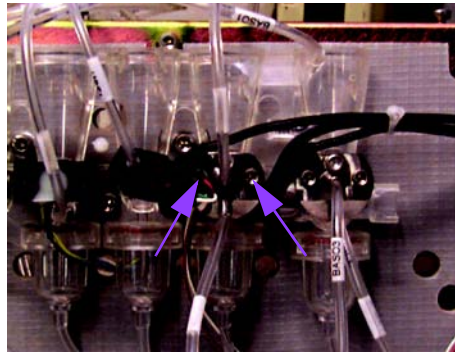
Diag.18 Electrode O'ring replacement

Reassemble the electrode then repeat the same operation for the other electrode.



## 11. Counting head aperture joint replacement (2xGBG275A)

Carefully dismantle the counting head (See Diag.19 “Counting heads dismantling”, page 11) and plunge the aperture in distilled water.



Diag.19 Counting heads dismantling

Replace EPO joints by new ones (See Diag.20 “Counting heads aperture joint”, page 11).



Diag.20 Counting heads aperture joint

Clean the chamber and the counting head with liquid soap.



Do not introduce any sharp instrument inside so as to avoid damaging the inside of the chamber and the aperture.

Do not manipulate the aperture using hard instruments. Clean the aperture with a piece of soft paper or preferably in between 2 fingers.

Rinse thoroughly with distilled water.

Dry the exterior of the chamber with a soft paper.



It is recommended to reconnect the tubes on the counting head before reassembling the electrode and the chamber in order to avoid applying constraint on the chamber.

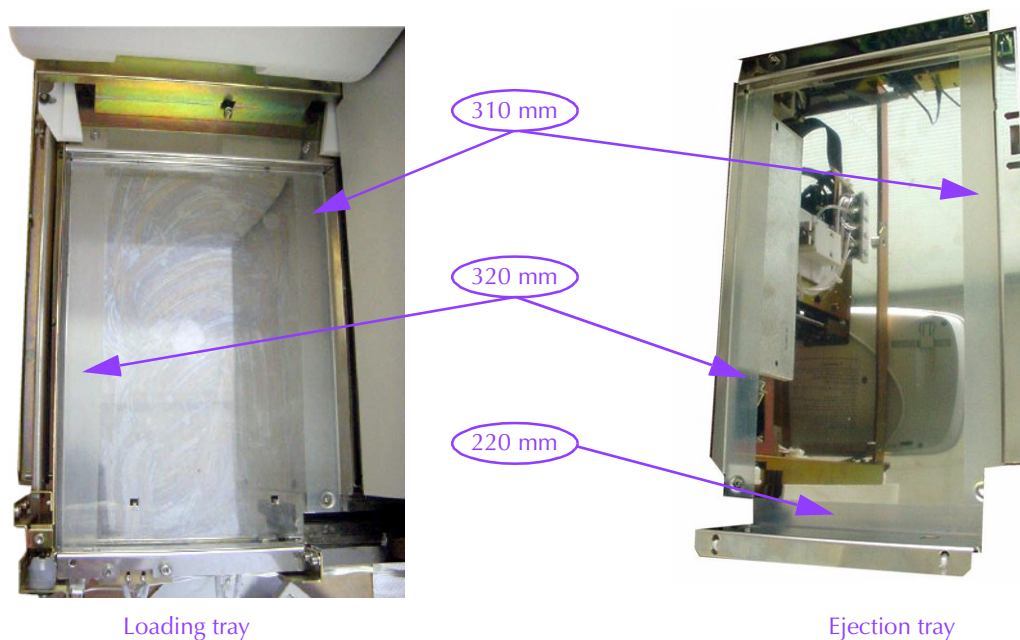
Do not apply too much pressure on the electrode fixation screws as it can break the aperture. Tightening torque = 400 m.Nm (17 Ozf.in).

Reassemble the electrode.

Repeat the same operation with the other counting head.

## 12. Tape on trays

If the Sliding bands located on Loading and Ejection trays are damaged, replace them using the Tape (JAJ007A) included in the kit (See Diag.21 “Sliding bands”, page 12).  
Use Acetone to clean the trays.



Diag.21 Sliding bands

## 13. Check up after intervention

Before reassembling the covers start the instrument and check there is no leak.  
Reassemble the covers then perform the RAS340 Check up after intervention procedure

## Piston kit replacement Procedure

RAS327B



- Concerns

Pentra 80 maintenance procedure

- Sampling probe: Percutor replacement
- Reagents syringe: Pistons replacement
- Vacuum\waste pump: Piston replacement

- Required tools

- Hexagonal Keys
- Dynamometric screw drivers A302, A301, A300
- Cutting pliers
- Flat screw driver
- Philips screw drivers
- Torx keys

- Required products

Minoclair

- Intervention time

2h.

- Frequency

See maintenance table

- Specific kit or consumables

Piston & Needle kit: XEA711CS



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Piston & Needle kit

Table 1: Piston & Needle kit XEA711CS

P/N	Designation	Qty
GBC030A	Reagent syringe Piston	4
GBC031A	Reagent syringe Piston	1
GBG260A	Piston D=31 Spacer	3
GBG274A	Piston D=31	3
KAA009A	CHC M3x20 Screws	9
GBG169A	Percutor	1



This procedure must be performed on a clean instrument. If the instrument is suspected not to be perfectly clean, perform a concentrated cleaning.

## 2. Maintenance

### 2.1. Percutor (GBG169A) replacement

Switch the instrument off and disconnect power supply cable.

Open the righthand side door.

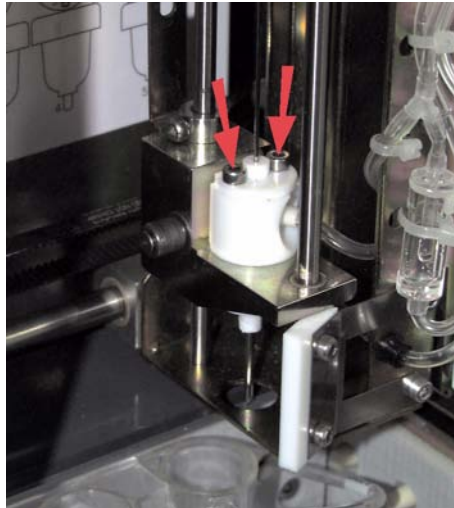
Move the carriage to access to the rinsing block.

Remove the 2 rinsing block screws (See Diag.1 “[Rinsing block dismantling](#)”, page 2).



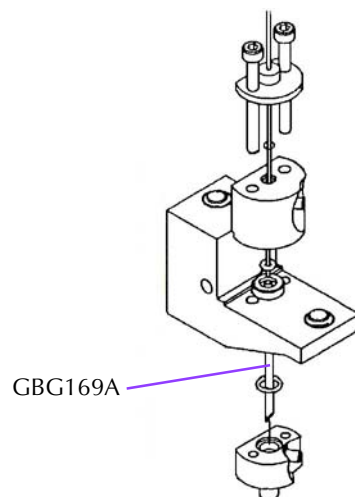
Diag.1 Rinsing block dismantling

Lift the locker (See Diag.2 “[Lift locker](#)”, page 3) to free the probe and remove the rinsing block.



Diag.2 Lift locker

Replace the percutor (See Diag.3 “Rinsing block unit”, page 3).



Diag.3 Rinsing block unit



Use new O’rings when performing 6 month maintenance at the same time.  
Change the needle (XDA655DS) when performing Yearly maintenance at the same time.  
Do not tight too much the rinsing block screws (Torque: 120 mN.m \ 17 Ozf.in).

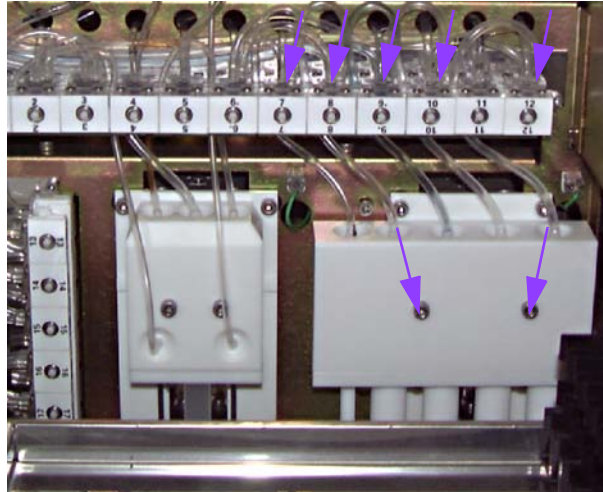
Reassemble in reverse order.

## 2.2. Reagent syringe pistons replacement (GBC031A & 4xGBC030A)

Switch the instrument off and disconnect power supply cable.  
Remove the cover and the lefthand side panel to access to the reagent syringe (See RAS342 Front panel & Covers dismantling procedure for further details).

Disconnect the following tubes (See Diag.4 “Reagent syringe dismantling”, page 4):

- Valve 7 Inlet 3
- Valve 8 Inlet 3
- Valve 9 Inlet 3
- Valve 10 Inlet 3
- Valve 12 Inlet 3



Diag.4 Reagent syringe dismantling

Unscrew the 2 fixation screws and remove carefully the reagent syringe (See Diag.4 “Reagent syringe dismantling”, page 4).

Push several times the piston over the waste container to drain the syringes.

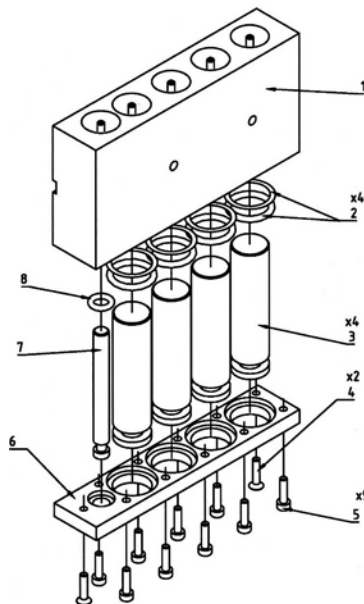
On a piece of absorbant paper open the reagent syringe: 9x CHC M3x12 screws, 2x FX M3x12 screws.

Replace the pistons (See Diag.5 “Reagent syringe piston replacement”, page 4).



Use new O’rings when performing 6 month maintenance at the same time.

The thickness of the washer is matched to each O’ring thickness. For this reason, keep the O’ring and the washer together. Lyse piston O’ring (small one) had no washer.



Diag.5 Reagent syringe piston replacement



Tightening torques

9x CHC M3x12:

400 mN.m (56.8 Ozf.in)

2x FX M3x12:

400 mN.m (56.8 Ozf.in)

Reassemble in reverse order (Use a dynamometric screwdriver to tighten the syringe).

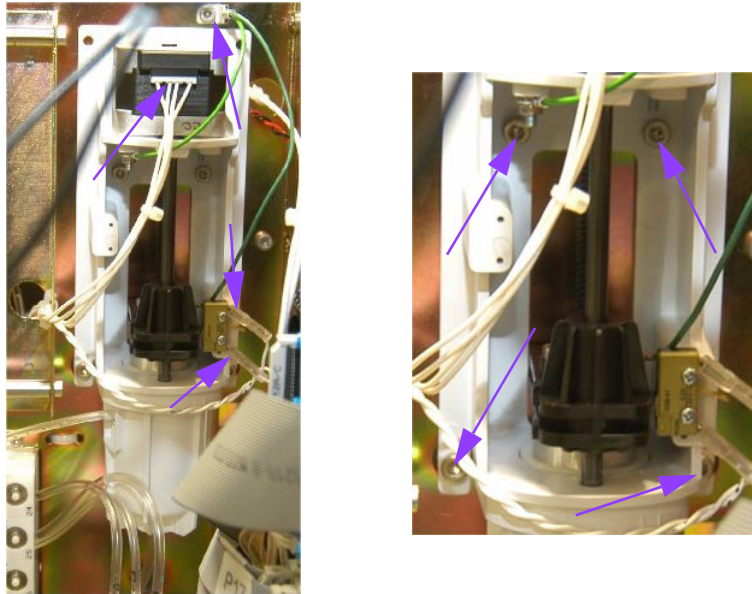


### 2.3. Draining syringe 1 piston replacement (GBG274A & GBG260A)

Switch the instrument off and disconnect power supply cable.

Remove the cover and the righthand side door to access to Draining syringe 1 (See RAS342 Front panel & covers dismantling procedure for further details).

Disconnect electrical connectors from the syringe, then unscrew the 4 syringe screws, just few turns to free silent block (See Diag.6“[Draining 1 syringe electrical connections.](#)”, page 5).



Diag.6Draining 1 syringe electrical connections.

Put a piece of absorbant paper under the syringe and disconnect all the tubes from the syringe.

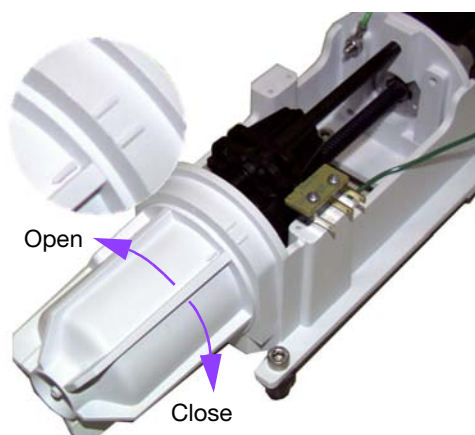
Remove the syringe.

Drain the syringe pushing the piston nut up and down several times.

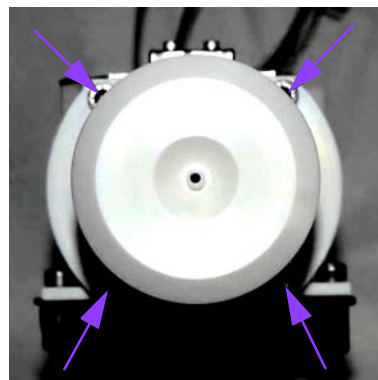
Open the syringe

- 4xCHC M4x16 screws on old model
- Rotation of the Syringe body on new model (See Diag.7“[Draining 1 syringe opening](#)”, page 5).

[Molded Syringe \(New model\)](#)



[Machined Syringe \(Old model\)](#)



Diag.7Draining 1 syringe opening

Prepare the piston: On the new molded syringe, the piston (1) is shorter (See Diag.8“Pistons”, page 6).

For new molded syringe, install only the piston GBG274A (1)

For old machined syringe, use the piston GBG274A (1) + the cross piece GBG260A (2) and use the CHC M3x20 screws from the kit.



Diag.8Pistons



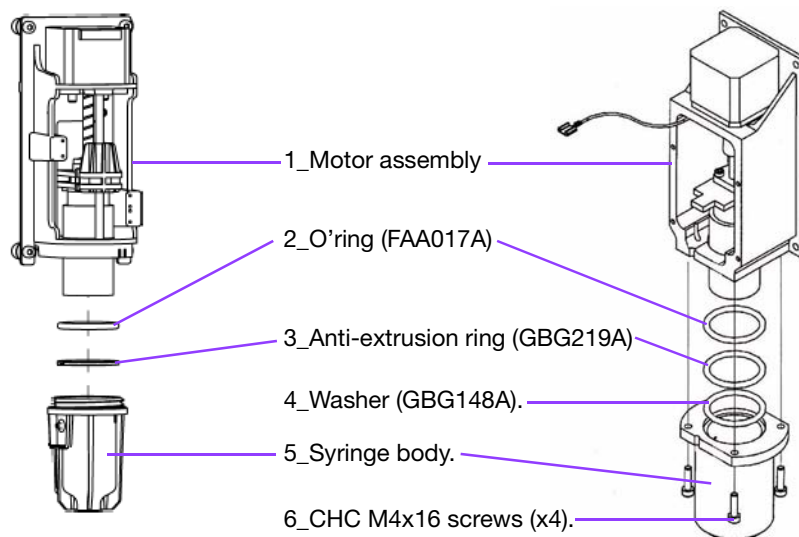
Use new O'ring when performing 6 month maintenance at the same time.  
O'ring (FAA017A) + Washer (GBG148A) = XDA621A

Reassemble in reverse order (See Diag.9“Draining syringe 1 view”, page 6).

Chamber body of the new syringe is directly screwed on the motor block. When the body is reinstalled on the motor block, it has to be rotated until the mark on the body is located between the two marks of the motor block.

Molded Syringe (New model)

Machined Syringe (Old model)



Diag.9Draining syringe 1 view

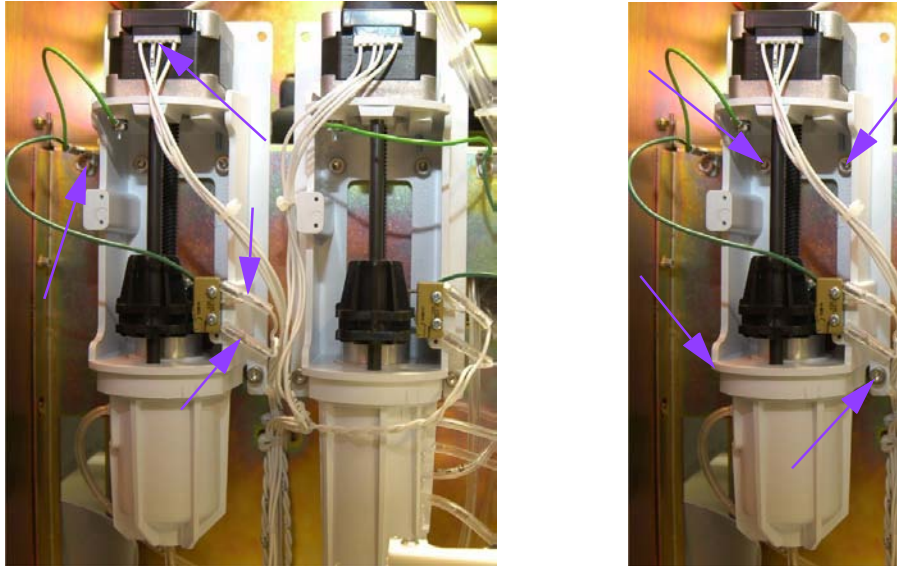


## 2.4. Draining syringe 2 piston replacement (GBG274A & GBG260A)

Switch the instrument off and disconnect power supply cable.

Remove the cover and the lefthand side panel to access to the reagent syringe (See RAS342 Front panel & Covers dismantling procedure for further details).

Disconnect electrical connectors from the syringe then unscrew the 4 syringe's screws, just few turns to free the silent blocks (See Diag.10 "Draining syringe 2 dismantling", page 7).



Diag.10 Draining syringe 2 dismantling

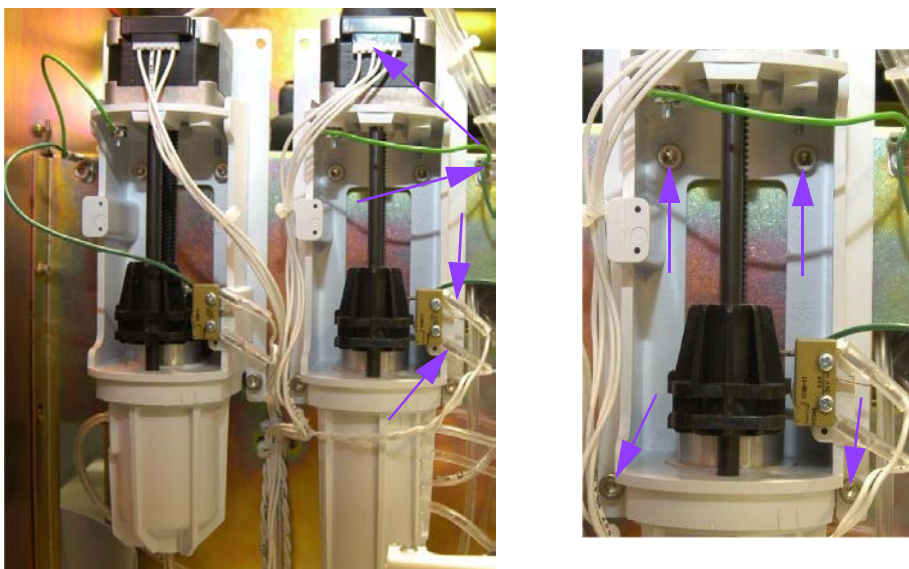
Follow the same procedure than for Draining syringe 1 to replace the piston. (see above).

## 2.5. Counting syringe piston replacement (GBG274A & GBG260A)

Switch the instrument off and disconnect power supply cable.

Remove the cover and the lefthand side panel to access to the reagent syringe (See RAS342 Front panel & Covers dismantling procedure for further details).

Disconnect electrical connectors from the syringe then unscrew the 4 syringe's screws, just few turns to free the silent blocks (See Diag.11 "Counting syringe electrical connections", page 7).



Diag.11 Counting syringe electrical connections

Follow the same procedure than for Draining syringe 1 to replace the piston. (see above).

### 3. Instrument cleaning

Concerned assemblies:

- All the thermostated compartment.
- Outer surfaces of the instrument (perpex, covers, reagent locations....).
- Waste connector plug.
- Liquid valve push button.
- Assemblies close to the needle.
- Tube holder assembly.
- Overflow trays.

Cleaning:

Dilute the 12°cl bleach to 1 part of bleach for 4 of deionize water (1/5).

Instrument environment must be cleaned.

No sponge, nor cloth must be used. Only absorbant paper, thrown after use in contamination bins, have to be used. For small or sensitive assemblies, use accurate drier papers.

All assemblies suspected to have been in contact with biohazardous material must be disinfected with diluted bleach (the stainless steel must be bleached below 30°Celsius).

Blood stains or salt marks must be cleaned with spray detergent first.

Reinstall all the assemblies and setup the instrument back to its initial configuration.

## Decontamination and rinse Procedure

RAS328B

\_\_\_\_\_



- Concerns

Instrument decontamination before maintenance operations in the following cases:

- Instrument removed from biohazardous area
- Maintenance intervention on contaminated assemblies

- Required tools

- Hexagonal keys
- Clamps
- Flat screw driver
- Torx keys

- Required products

- Fungicidal, bacterial, virus killing detergent spray, non corrosive for metals, non plastic altering.
- Bleach solution 12°CI
- Deionized water
- Distilled water
- Absorbant paper

- Intervention time

1h30min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Preparation

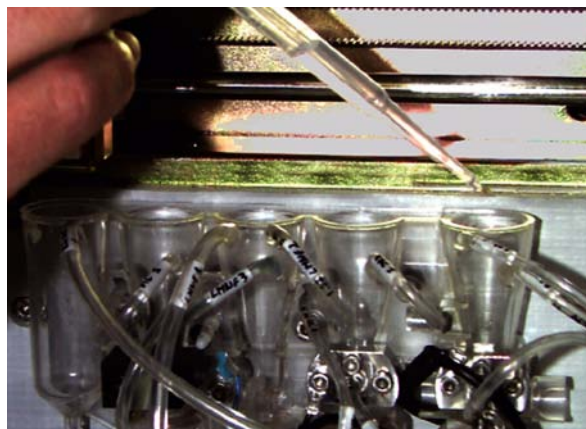
Switch the instrument on.

Open the thermal door (Righthand side of the instrument).

Perform an **Concentrated Cleaning** from menu: **Service\Menu SuperUser\Hydraulical\Clean Cycles**.

Confirm the concentrated cleaning by pressing **Ok** button.

When asked during the concentrated cleaning cycle, pour 3ml of Minocclair in each chamber, then click ok to continue.



*Diag. 1 Pour Minocclair*

When cycle is finished, switch the instrument off and remove the power supply cable.

Remove the instrument's covers (See procedure RAS342).

Spray the bactericidal cleaner on all biohazardous areas (assemblies in contact with the biohazardous material such as instrument cover, tube holder, keyboard...) and waits for 10 minutes.

## 2. Manual decontamination

Dilute the 12°Cl bleach to 1 part of deionize water (1/5).

Instrument environment must be cleaned and decontaminated.

No sponge, nor cloth must be used, only absorbant paper thrown after use in contamination bins, have to be used. For small or sensitive assemblies use accurate drier papers.

All assemblies suspected to have been in contact with biohazardous material must be disinfected with diluted bleach (the stainless steel must be bleached below 30°C).

Blood stains or salt marks must be cleaned with spray detergent first.

Concerned assemblies:

- Outer surfaces of the instrument (perpex, covers, reagent locations...)
- Waste connector plug
- Liquid valve push button
- Assemblies close to the needle
- Overflow tray

Put back all the assemblies and setup the instrument back to its initial configuration.

## 3. Analysis circuit decontamination

Prepair 1 bottle containing 1/2 litre of bleach diluted to 1 part of bleach for 9 parts of deionize water (1/10).

Prepair 1 bottle containing 1/2 litre of distilled water.

Replace the reagent bottles (Alphalyse, Basolyse II and Eosinofix) by the diluted bleach bottles

Switch the instrument on.

Run an **All reagents** prime cycle from menu: **Service\Menu SuperUser\Hydraulical\Prime**

**cycles.**

Fill a sample tube with diluted bleach to 1 part of bleach for 4 parts of deionize water (1/5).

Run 15 **Burn-in** cycles from menu: **Service\Menu Technician \Others\Burn-in cycle**.

Enter 15 cycles in Total **Cycles To Do** then press button **Start rack** (See “Burn-in cycle screen”, page 3).

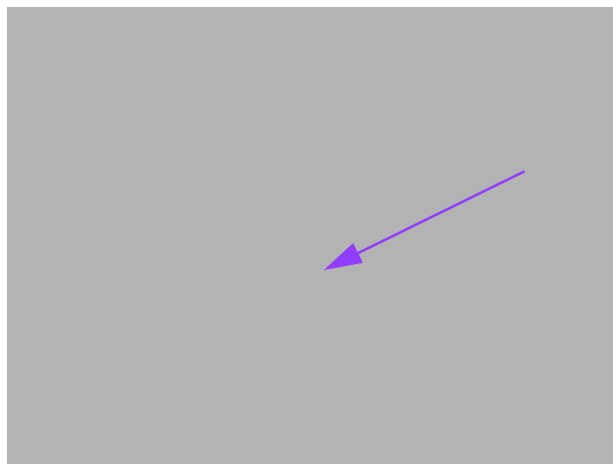
Diag.2 Burn-in cycle screen

Leave the instrument operating until it stops.

#### 4. Instrument Rinse

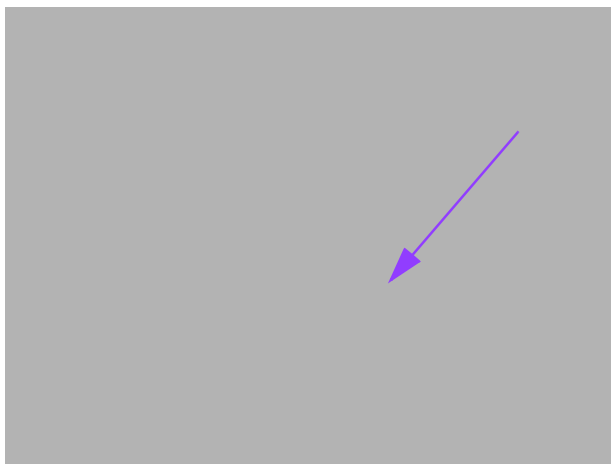
Run this procedure before the transport of the instrument, after a demonstration or before a long period without functioning.

- 1- Run an Instrument general cleaning.
- 2- Remove straws from Reagent bottles and plunge them into an empty bottle.
- 3- Remove straw from Diluent cubitainer and plunge it into the empty bottle.
- 4- Enter: **Service \ Super User Menu \ Hydraulic \ Unprime Cycle** then click the «All» button (See “Unprime cycle screen”, page 3).



Diag.3 Unprime cycle screen

- 5- Press the «Validate» button then repeat this cycle a second time.
- 6- Dry the straws using absorbant paper.
- 7- Plunge the straws in a bottle full of distilled water.
- 8- Enter: **Service \ Super User Menu \ Hydraulic \ Prime Cycles** then click the «ALL REAGENTS» button (See “Prime cycles screen”, page 4).



Diag.4Prime cycles screen

- 9- Press the «Validate» button then repeat this cycle a second time.
- 10- Run several manual cycles.
- 11- Remove the straws from the distilled water bottle then plunge them into an empty bottle.
- 12- Run several «ALL» Unprime cycles (See “Unprime cycle screen”, page 3) to drain the instrument.

## Chambers Adjustment Procedure

RAS329B



- Concerns  
Chambers check and alignment
- Required tools  
Allen keys
- Required products  
None
- Intervention time  
15 min.
- Frequency  
On request
- Specific kit or consumables  
None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.



It is mandatory to perform the Probe adjustment procedure after this adjustment.

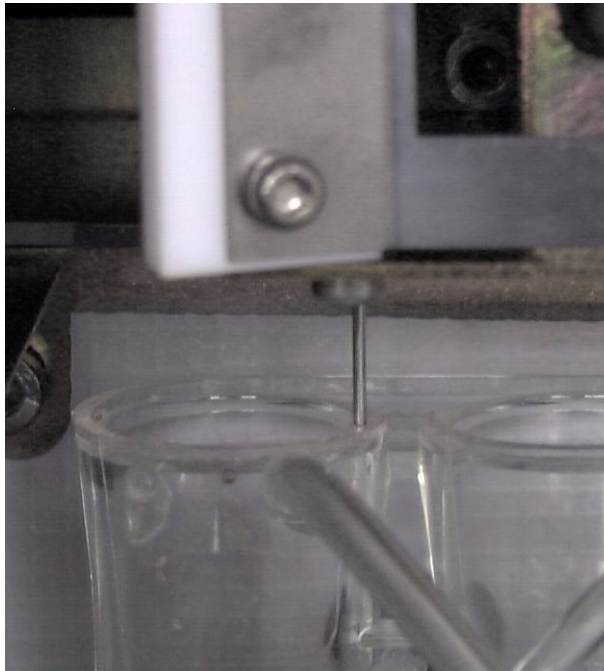
## 1. Alignment check and adjustment

This adjustment procedure must be carried out when chamber assembly is moved or replaced.

Switch off the instrument and disconnect power supply cable.

Remove cover (See RAS342)

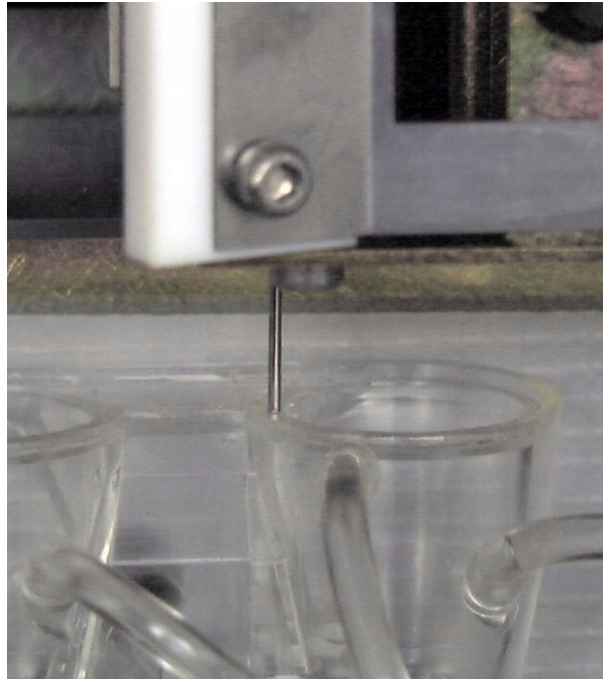
Move the carriage over the rinse chamber, then gently push down on the probe until it touch the top of the rinse bath (See Diag.1 “[Rinse chamber position](#)”, page 2).



*Diag.1 Rinse chamber position*

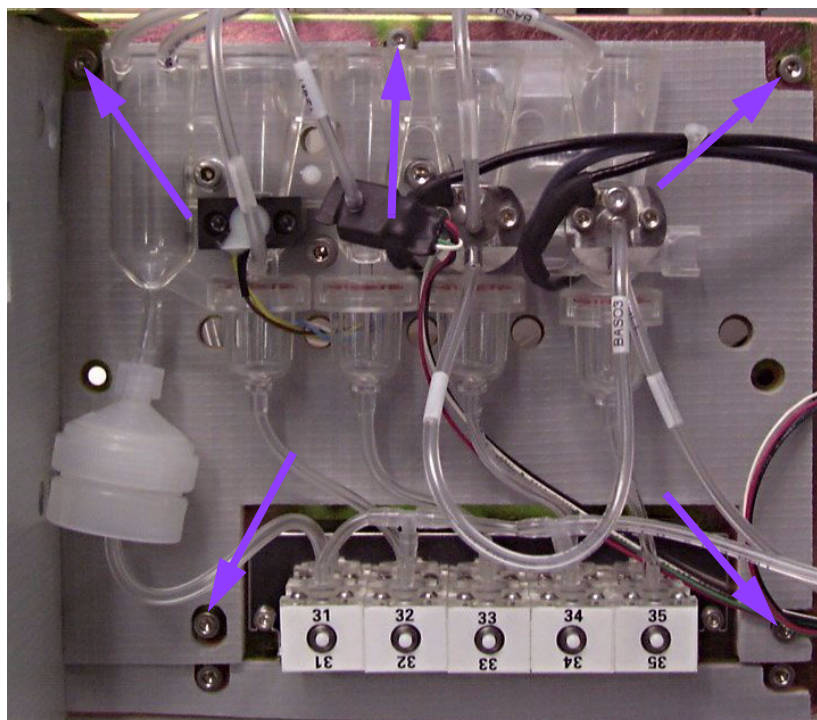
Without lifting the probe, gently push the carriage over the WBC/BASO chamber (See Diag.2 “[WBC chamber position](#)”, page 3).





Diag.2 WBC chamber position

Check that there is the same height between probe and Rinse and WBC/Baso tops of chambers. If you need to get a better position, free the chamber support by loosening the 5 screws. (See Diag.3 “Chamber support screws”, page 3).



Diag.3 Chamber support screws

Locate probe (See Diag.1 “Rinse chamber position”, page 2).

Tighten gently the left upper screw.

Without lifting the probe, gently push the carriage over the WBC/BASO chamber. (See Diag.2 “WBC chamber position”, page 3)

Check that there is the same height between probe and Rinse and WBC/Baso tops of chambers.

If necessary adjust position by moving up and down chamber support.

Perform an alignment check as describe at the beginning of this procedure.

When adjustment is correct, tighten screws and perform a **Probe adjustment** procedure.





- Concerns

Check and adjustment of the probe

- Required tools

Gauge set MAJ004A

- Required products

None

- Intervention time

15min

- Frequency

On request

- Specific kit or consumables

None



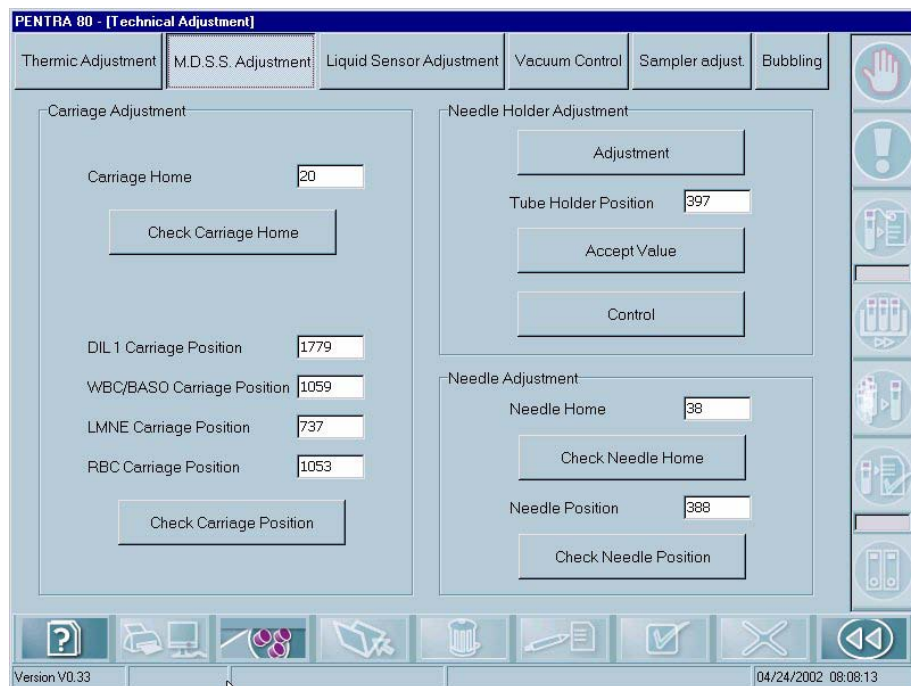
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. MDSS adjustment menu



Check that chamber assy is parallel to the carriage motion before checking or making an adjustment of the Probe position.  
Follow CHAMBERS ADJUSTMENT procedure of this manual (RAS329AA).

Probe adjustments can be accessed by: «Menu\Service\Menu Technician\Gains\MDSS adjustment» (See Diag.1 “MDSS adjustment menu”, page 2).



Diag.1 MDSS adjustment menu



Check probe position before any adjustment.

## 2. Needle adjustment

### 2.1. Needle Home Check

Remove cover (See RAS342).

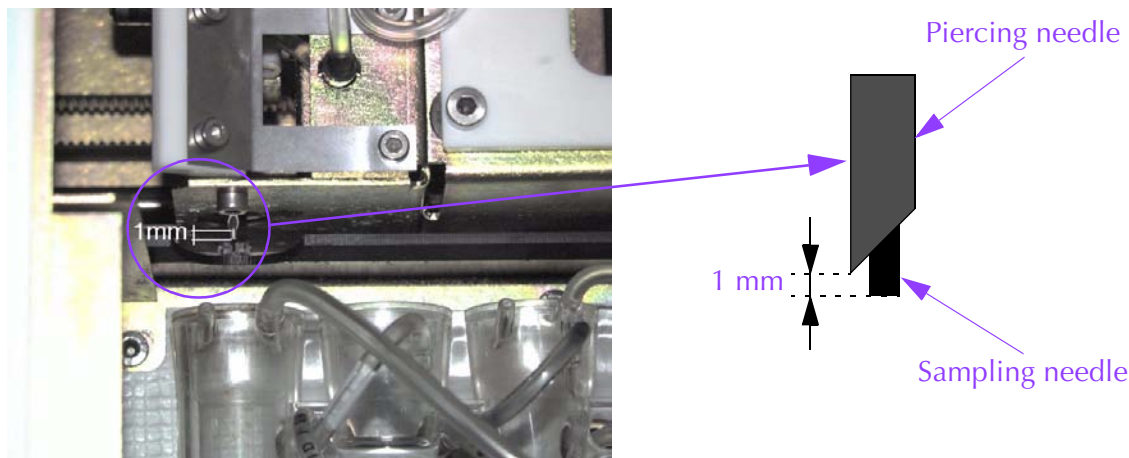
Enter «Menu\Service\Menu Technician\Gains\MDSS adjustment» (See Diag.1 “MDSS adjustment menu”, page 2).

Press «Check Needle Home» button (See Diag.2 “Check needle home”, page 3).

Check Needle Home

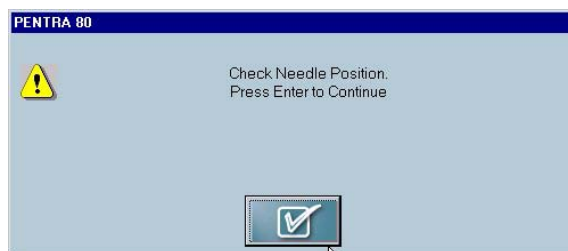
Diag.2 Check needle home

Check that the probe is about 1mm out from the piercing needle (See Diag.3 “Needle home position”, page 3).



Diag.3 Needle home position

Press «OK» to continue (See Diag.4 “Check needle position button”, page 3).



Diag.4 Check needle position button

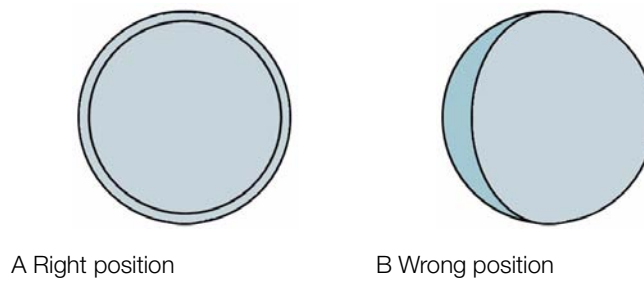
## 2.2. Needle Home Adjustment

Check needle home position (See 2.1. “Needle Home Check”, page 2).  
 If probe is too low (gap>1mm), increase **Needle home** number of step.  
 If probe is too high (gap<1mm), decrease **Needle home** number of step.  
 Run the «**check needle home**» again to control the gap (See above).

## 2.3. Needle position check




To check the right position of the probe, you must see inlet as in diagram A and not as in diagram B (where circles are not concentric).



Remove cover (See RAS342).

Enter «**Menu\Service\Menu Technician\Gains\MDSS adjustment**» (See Diag.1 «**MDSS adjustment menu**», page 2).

Press «**Check Needle Position**» button (See Diag.5 «**Check needle position**», page 4).



Check Needle Position

Diag.5 Check needle position

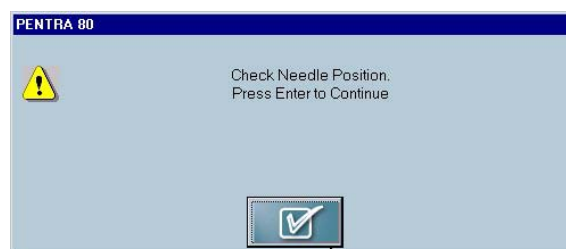
The sampling needle moves over the **LMNE chamber**.

Disconnect the tube connected to the inlet and check in front of the inlet the right location of the probe: if the probe is well adjusted, you will see it as in the following diagramm (See Diag.6 «**Needle perfect position**», page 4).



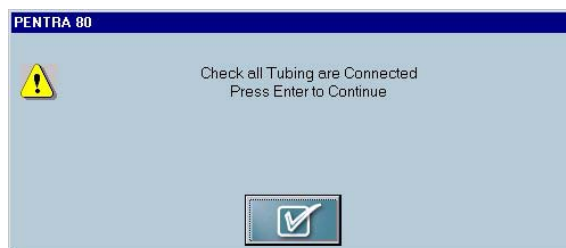
Diag.6 Needle perfect position

Press «**OK**» to continue (See Diag.7 «**Check needle position button**», page 4).



Diag.7 Check needle position button

At the end of the cycle, connect tubing to the inlet when the following screen appears (See Diag.8 «**Check tubing**», page 5).



Diag.8 Check tubing

Press «OK» to continue.

## 2.4. Needle position adjustment

Check needle position (See 2.3. “[Needle position check](#)”, page 3).

If probe is too low, increase **Needle position** number of step.

If probe is too high, decrease **Needle position** number of step.

Run the «**Check Needle Position**» again to control the good position (See above).

## 3. Carriage adjustment

### 3.1. Carriage home check & adjustment

Remove cover (See RAS342).

Enter «**Menu\Service\Menu Technician\Gains\MDSS adjustment**» (See Diag.1 “[MDSS adjustment menu](#)”, page 2).

Press «**Check Carriage Home**» button (See Diag.9 “[Check carriage home button](#)”, page 5).

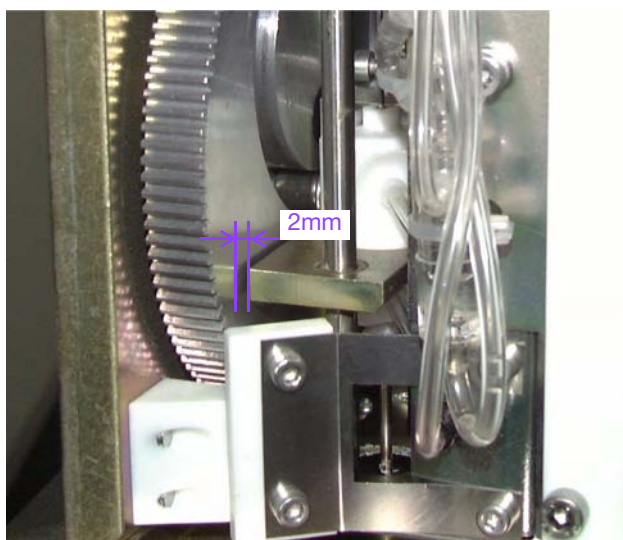


Diag.9 Check carriage home button



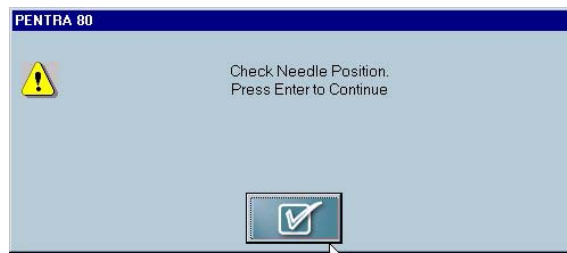
The «CARRIAGE HOME» position is factory adjusted and must not be changed. It represent a gap of 2mm between the tooth wheel and the front of the carriage (See Diag.10 “[Carriage home position](#)”, page 5).

This carriage position is also the Sampling position, if you need to readjust the Sampling position, move the tube holder instead of changing the «CARRIAGE HOME» value.



Diag.10 Carriage home position

Check the gap between the tooth wheel and the front of the carriage then press «OK» at the following screen (See Diag.11 “Check needle position button”, page 6).



Diag.11 Check needle position button

If the «Carriage home» position need to be adjust, change the «Carriage home» value then press the «Check Carriage Home» button again. Use MAJ004A gauge to check the gap between the tooth wheel and the front of the carriage.



By changing the «Carriage home» value, the carriage positions will change. If this position is modified, increase or decrease the «Dil 1 Carriage position» with the same number of steps, not to loose the other adjustments:

- Increase «Dil1 Carriage pos.» if you increase «Carriage home».
- Decrease «Dil1 Carriage pos.» if you decrease «Carriage home».

The «Sampling position» in the Tube holder will change too. Re-adjust the Tube holder position to centered the needle in the Tube Holder's sampling hole (See RAS338).



### 3.2. Carriage position check

Enter «**Menu\Service\Menu Technician\Gains\MDSS adjustment**»

Press «**Check Carriage Position**» button (See Diag.12 “[Check carriage position button](#)”, page 7).

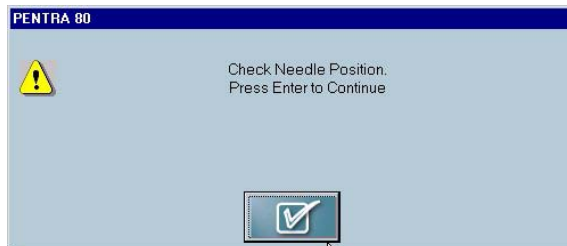


Diag.12 Check carriage position button

The sampling needle moves over a chamber.

Check the probe position as describe above (See Diag.6 “[Needle perfect position](#)”, page 4).

Press «**OK**» at the following screen (See Diag.13 “[Check needle position button](#)”, page 7) to move to the next chamber and continue until the end of the cycle.



Diag.13 Check needle position button

At the end of the cycle, connect tubing to the inlet when the following screen appears (See Diag.14 “[Check tubing](#)”, page 7).



Diag.14 Check tubing

Press «**OK**» to continue.

### 3.3. Carriage Positions adjustment



[Needle Up and Down position is the same for all the chambers and cannot be modified from one to another \(adjustment by Needle Position value\).](#)

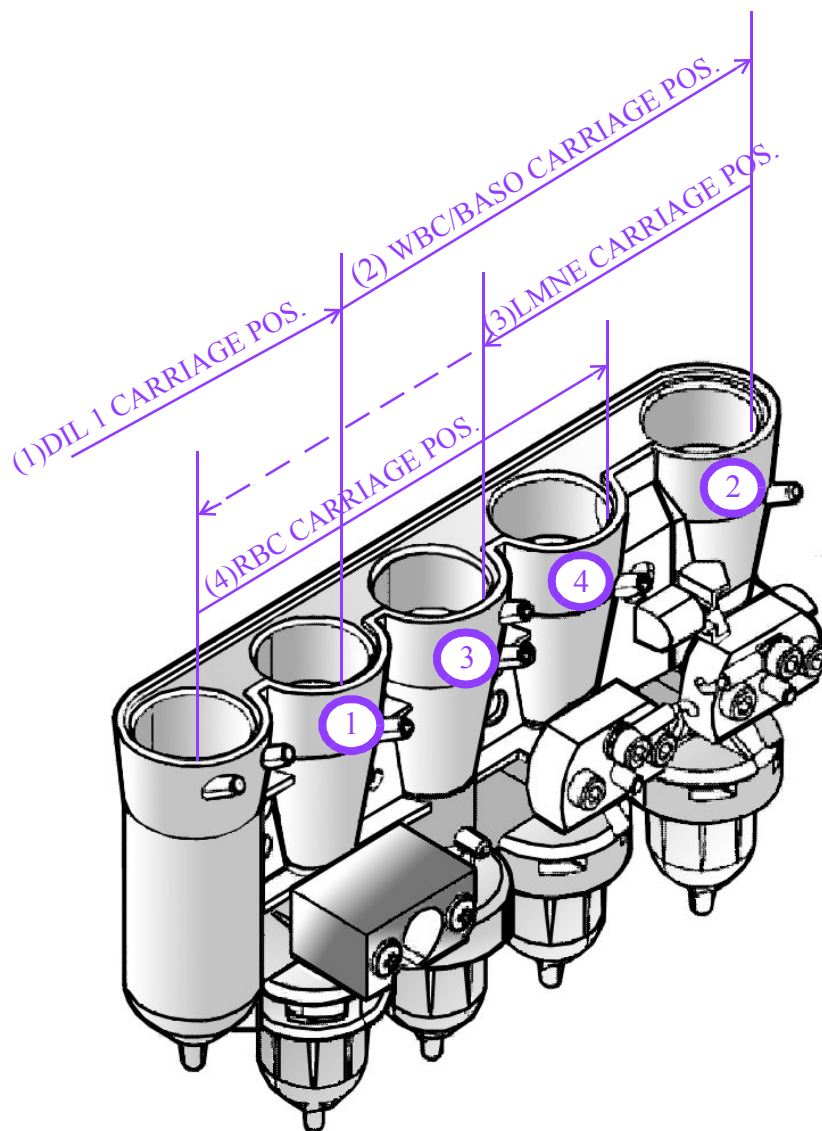
Before any adjustment, check the probe position in each chamber with the «**Menu\Service\Menu Technician\Gains\MDSS adjustment\Check Carriage Position**» option.

Adjust probe position for all the chambers separately in the software cycle order (See Diag.15 “[Carriage positions values](#)”, page 8).

DIL 1 Carriage Position	<input type="text" value="1779"/>
WBC/BASO Carriage Position	<input type="text" value="1059"/>
LMNE Carriage Position	<input type="text" value="737"/>
RBC Carriage Position	<input type="text" value="1053"/>
<input type="button" value="Check Carriage Position"/>	

Diag.15 Carriage positions values

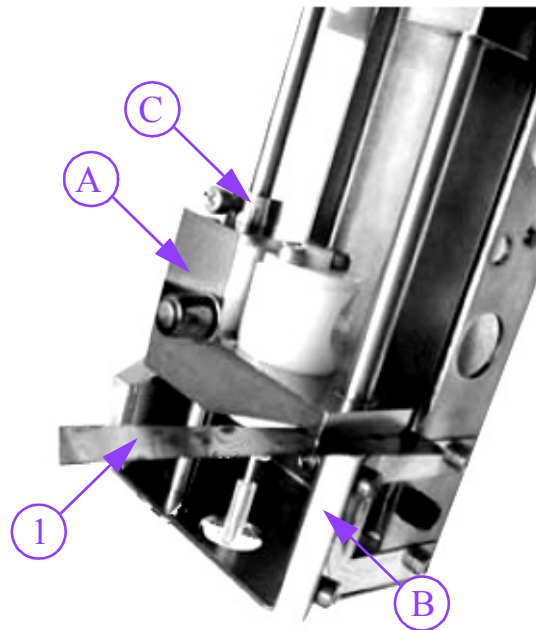
If you want to modify only one of the position, remind to increase or decrease the next motion with the same number of steps, not to loose the other adjustments See Diag.16 “Chambers”, page 8).



Diag.16 Chambers

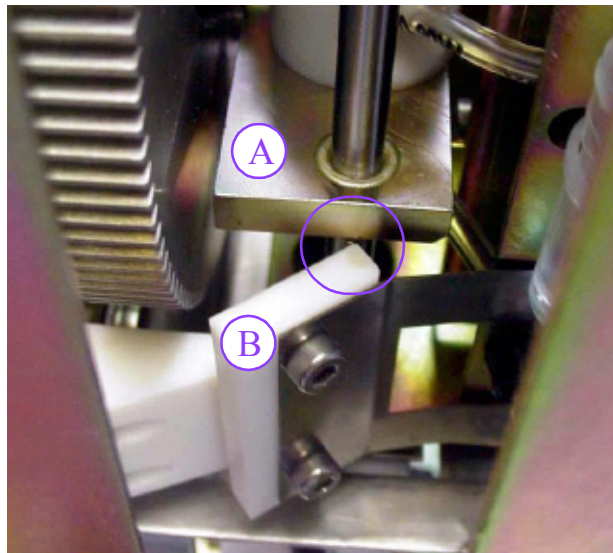
#### 4. Further adjustment

Use a 0.15 mm gauge (1) between the Piercing block (A) and the White safety block (B) to adjust the collar (C) blocking the carriage vertical movement (See Diag.17 “Collar adjustment”, page 9).



Diag.17 Collar adjustment

When the carriage is at the «Home position» (at 2 mm of the tooth wheel) adjust the gap between the White safety block (B) and the Piercing block (A) by unscrewing and moving the White safety part (See Diag.18 “White safety block adjustment”, page 9). The gap must be adjusted between 0.7 mm and 1 mm.



Diag.18 White safety block adjustment





- Concerns

Main board adjustment:

- How to access to Main board
- Main board general view
- Main board supply check
- Main board adjustment

- Required tools

- Allen keys
- Voltmeter

- Required products

RBC / PLT latex: LAD002AS

- Intervention time

30 min.

- Frequency

On request

- Specific kit or consumables

None

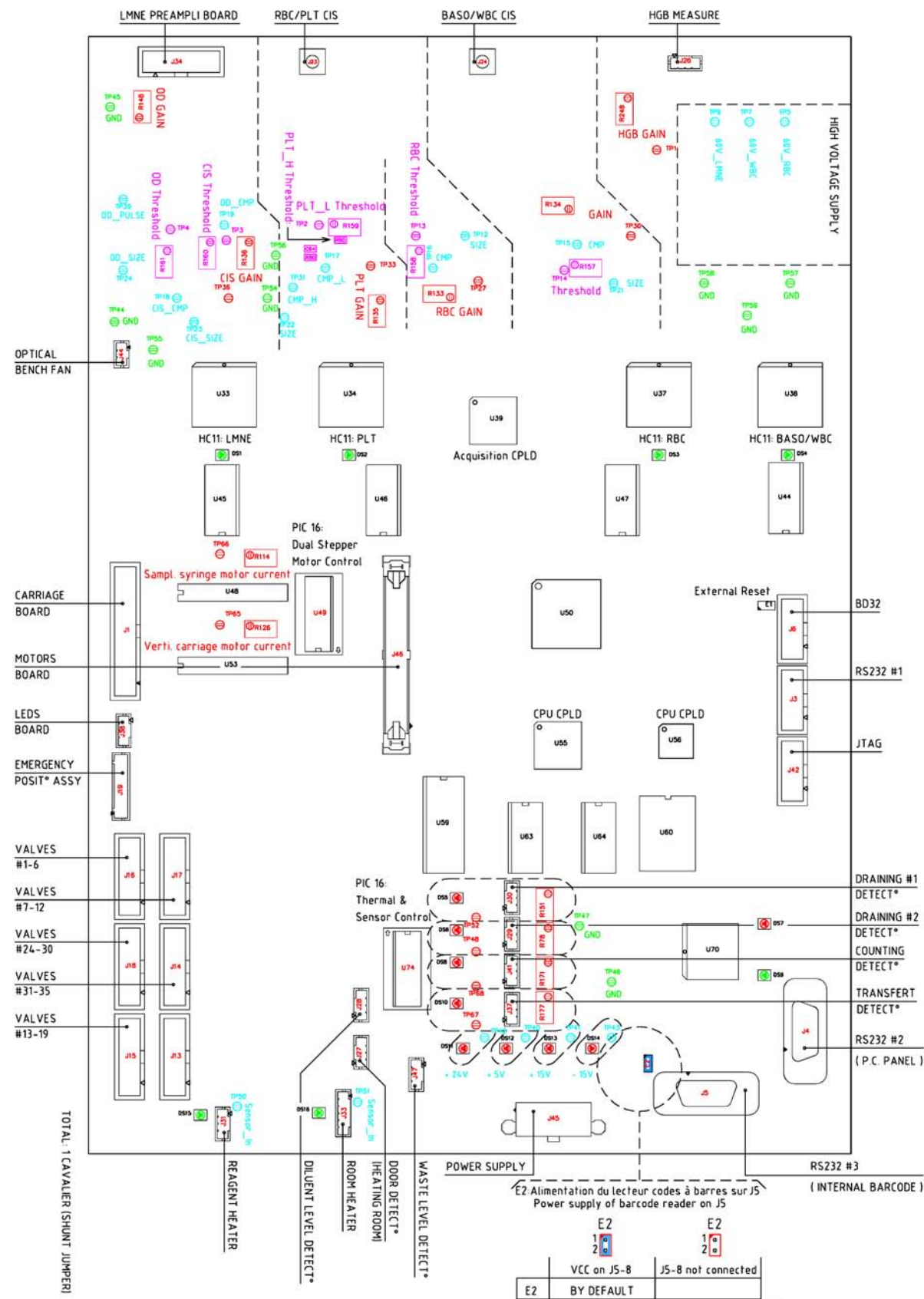


Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. How to access Main board

- Remove the righthand side cover of the instrument:
- Open the righthand side front cover.
- Remove the thermal panel.
- Unscrew the 9 screws from the righthand side cover and carefully remove the cover.
- Unscrew the 2 screws on the top of the frame from the inside protection and remove it.

2. Main board general view

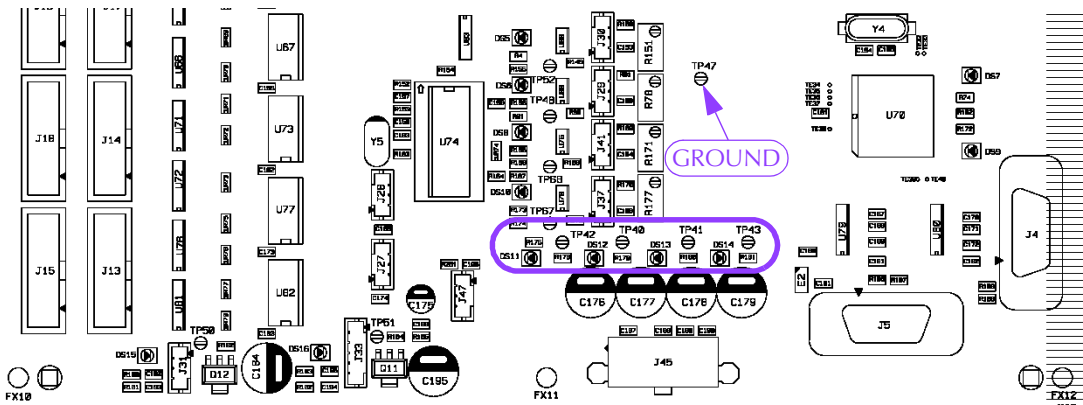


Diag.1 Main board general view

3. Main board check

3.1. Power supply check

The power supply test points are located at the bottom of the Main board and are not adjustable (See “Power supply test points”, page 4)



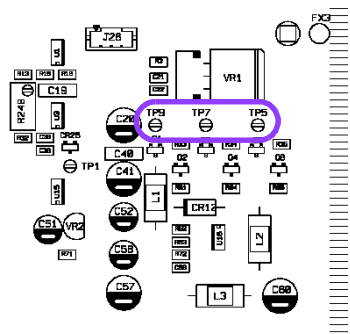
Diag.2 Power supply test points

Table 1: Power supply voltages check (Ground on TP47)

Voltage	Test Point	Range
+24V	TP42	±1.4V
+5V	TP40	±0.15V
+15V	TP41	±0.5V
-15V	TP43	±0.5V

3.2. High voltage supply check

The high voltage test points are located in the right upper part of the Main board and are not adjustable (See “High voltage test points”, page 4).



Diag.3 High voltage test points

Table 2: Hight Voltage check (ground on TP47)

Voltage	Test point	
60V	TP5	RBC aperture voltage
60V	TP7	WBC aperture voltage
60V	TP9	LMNE aperture voltage



## 4. Main board adjustment

Remove the righthand side cover in order to access to the main board.

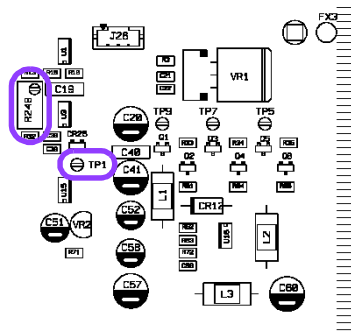
### 4.1. Hgb blank adjustment

Make sure the thermal door is closed.

Run command **Hgb Blank Adjustment** from menu: **Service\Technician\Measurement\Gain**.

The utility carries out a cycle a rinsing cycle of the WBC chamber and continuously displays the voltage used by the converter. The adjustment cycle lasts for 20 seconds.

Adjust to **4.7V  $\pm$  0.02V** between Ground and **TP1** by the mean of **R248** potentiometer (See “**HGB test point**”, page 5).



Diag.4HGB test point

### 4.2. RBC\Plt gain adjustment

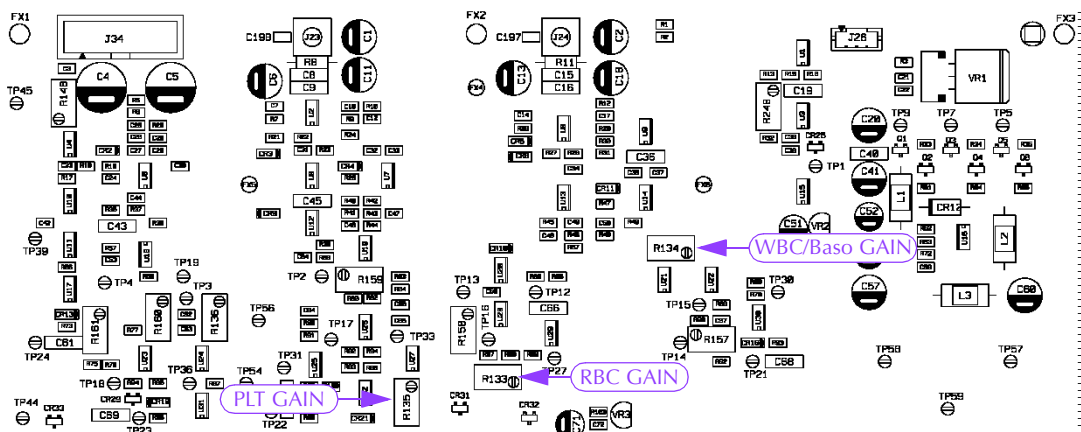
A special cycle allows the dilution of the RBC\Plt LATEX to 1/220th (10 $\mu$ l of LATEX with 2.2ml of diluent). A special count program carries out the calculation of the mean volume in the predefined zones and displays them every 700ms. The duration of the measurement cycle is 21 seconds.

The adjustment are made using **R133** potentiometer for **RBC** and **R135** for the **Plt**.

Run command **RBC\Plt Gain** from menu: **Service\Technician\Measurement\Gain**.

Target values:

- **RBC = 78**
- **Plt = 112**



Diag.5Gains



Mix RBC\Plt LATEX thoroughly before sampling.

#### 4.3. WBC\Baso gain adjustment

A special cycle allows the dilution of the RBC\Plt LATEX to 1/733rd (3 $\mu$ l of LATEX with 2.2ml of diluent). A special count program carries out the calculation of the mean volume in the predefined zones and displays them every 700ms. The duration of the measurement cycle is 21 seconds. The adjustment is made using **R134** potentiometer (See “Gains”, page 5).

Run command **WBC\Baso Gain** menu: **Service\Technician\Measurement\Gain**.

Target values:

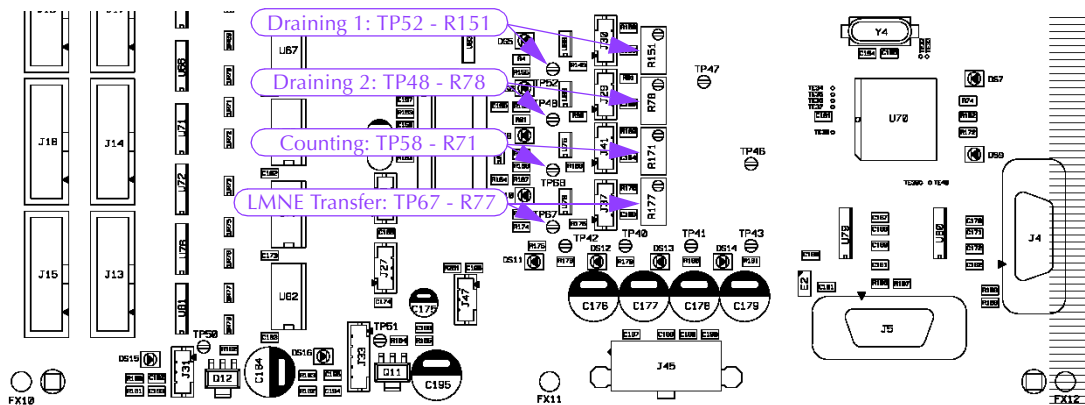
- **WBC\Baso = 102**



Mix RBC\Plt LATEX thoroughly before sampling.

#### 4.4. Liquid sensors adjustment

The liquid sensor test points are located at the bottom of the Main board (See “Liquid sensor test points”, page 6).



Diag.6 Liquid sensor test points

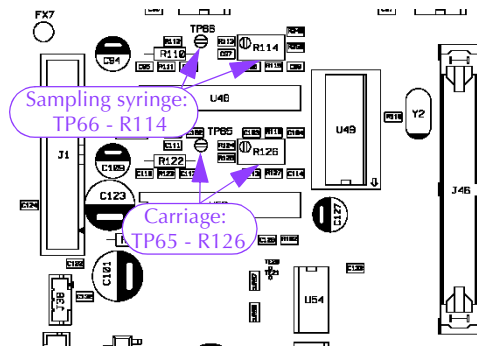
From menu **Service\Technician\Measurement\Gain\Liquid sensor adjustment** adjust all the different voltage values according to the following table.

Table 3: Liquid sensors adjustment

Liquid Sensor	Test Point	Potentiometer	Range \ Connector
Draining 1	TP52	R151	4.5V $\pm$ 0.3V \ J30
Draining 2	TP48	R78	4.5V $\pm$ 0.3V \ J29
Counting5	TP68	R171	4.5V $\pm$ 0.3V \ J41
Transfert LMNE	TP67	R177	4.5V $\pm$ 0.3V \ J37

## 4.5. Motor current adjustment

The motor current test points are located in the middle of the Main board, on the left (See “[Motor test points](#)”, page 7).



Diag.7 Motor test points

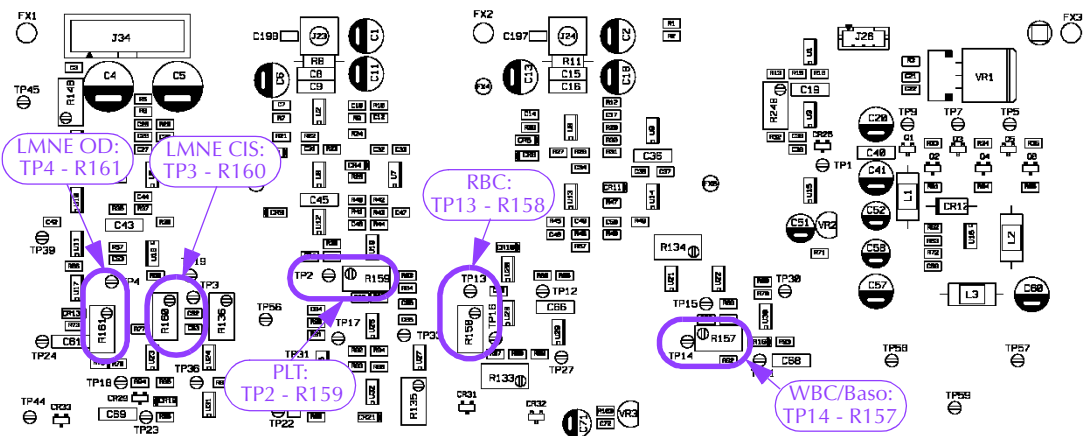
Check and adjust if necessary the motor current according to the following table.

Table 4: Motor current

Motor	Test Point	Potentiometer	Range
Sampling syringe	TP66	R114	2V $\pm$ 0.05V
Carriage	TP65	R126	4.5V $\pm$ 0.3V

## 4.6. Threshold adjustment

The threshold test points are located at the top of the Main board (See “[Threshold](#)”, page 7).



Diag.8 Threshold

Check and adjust if necessary the threshold voltages according to the following table.

Table 5: Thresholds adjustment

Threshold	Test Point	Potentiometer	Range
Baso	TP14	R157	390mV $\pm$ 5mV
RBC	TP13	R158	390mV $\pm$ 5mV
Plt	TP2	R159	390mV $\pm$ 5mV
LMNE CIS	TP3	R160	700mV $\pm$ 5mV
LMNE OD	TP4	R161	350mV $\pm$ 5mV



## Motor Board Adjustment Procedure

RAS332B



- Concerns

Motor board adjustment:

- How to access to Motor board
- Motor board general view
- Motor board check and adjustment

- Required tools

- Allen keys
- Voltmeter

- Required products

None

- Intervention time

15 min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

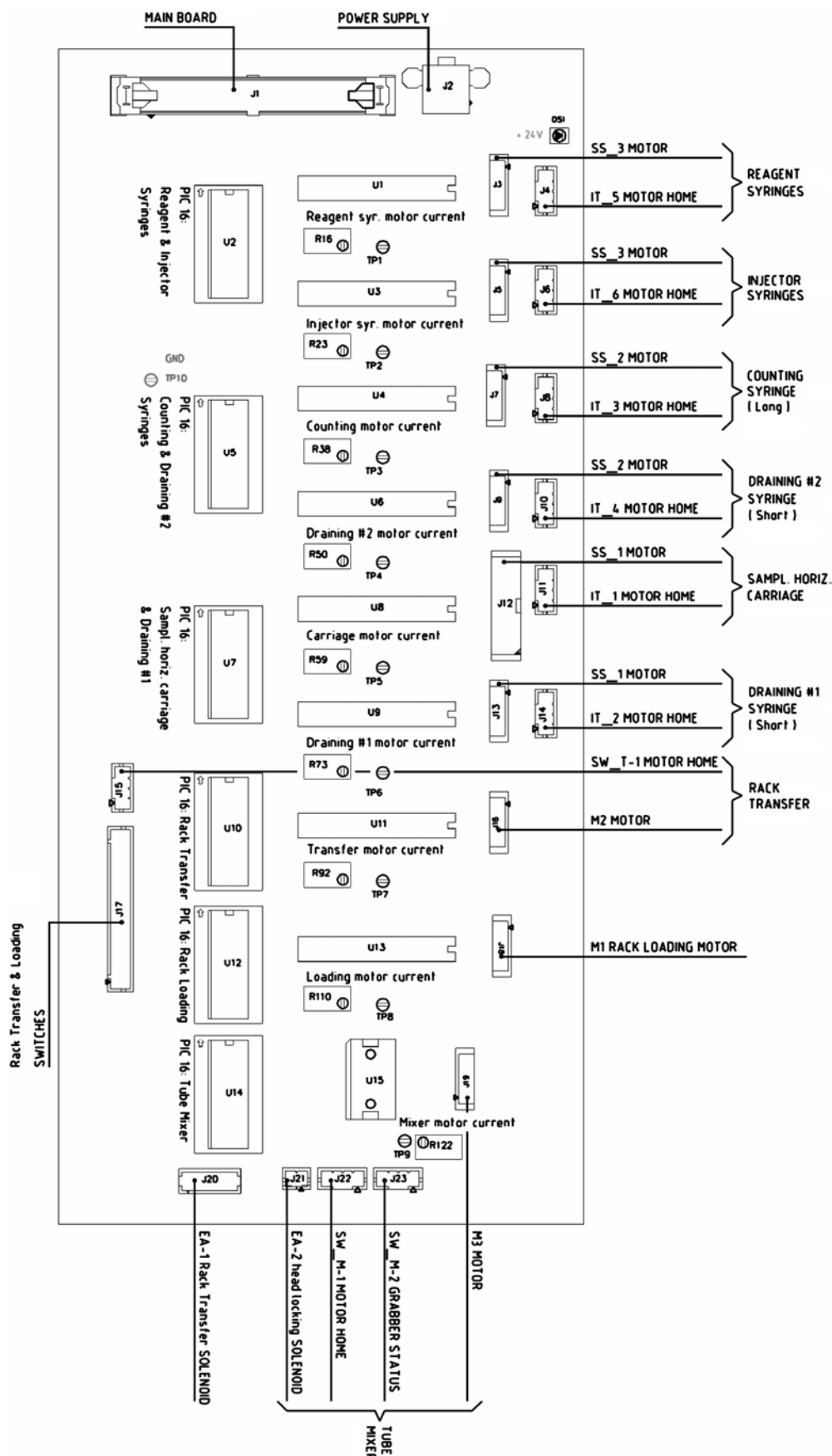
## 1. How to access to the Motor board

The motor board is located under the sampler loader system on the lefthand side of the instrument.

- Lift up the reagent cover and remove the bottles.
- Remove the plastic protection under the reagents.
- Remove the lefthand side panel of the instrument (4 screws).
- Remove the reagent frame under the plastic protection (5 screws).
- Remove the sampler loader inox plate (4 screws).
- Remove the motor board plastic protection (2screws).

For more details about the dismantling of the instrument covers refer to procedure RAS342 Front panel & Covers dismantling.

## 2. Motor board general view



Diag.1 Motor board general view

### 3. Motor board check and adjustment

Table 1: Motor board check and adjustment target values

Motor	Test Point	Potentiometer	Target
Reagent syringe	TP1	R16	4V $\pm$ 0.05V
Optical bench syringe	TP2	R23	3V $\pm$ 0.05V
Counting syringe	TP3	R38	4,8V $\pm$ 0.05V for Molded Syringe (New)* 4,0V $\pm$ 0.05V for Machined Syringe (Old)
Draining syringe #2	TP4	R50	4,8V $\pm$ 0.05V for Molded Syringe (New)* 4,0V $\pm$ 0.05V for Machined Syringe (Old)
Horizontal carriage	TP5	R59	3V $\pm$ 0.05V
Draining syringe #1	TP6	R73	4,8V $\pm$ 0.05V for Molded Syringe (New)* 4,0V $\pm$ 0.05V for Machined Syringe (Old)
Sampler	TP7	R92	3.5V $\pm$ 0.05V
Loader	TP8	R110	3.5V $\pm$ 0.05V
Mixer ( $\mu$ step motor)	TP9	R122	0.6V $\pm$ 0.05V



This motor current new value is only applicable on new motorisation assemblies: in case a new piston is installed on an old syringe assembly (motor + syringe), the motor current remains 4V $\pm$ 0,05V



## Temperature Adjustment Procedure

RAS333B

\_\_\_\_\_



- Concerns

Reagent heating coil and Thermostatic compartment temperature adjustment.

- Required tools

- Thermometer

- Required products

None

- Intervention time

30 min.

- Frequency

On request

- Specific kit or consumables

None



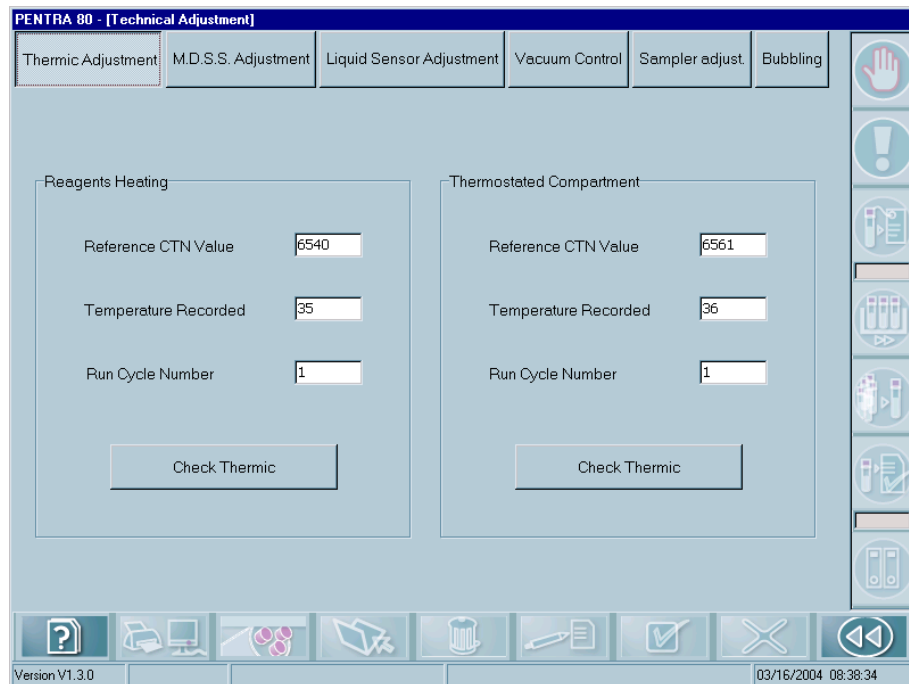
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Reagent Heating Coil Check & Adjustment

Start the instrument.

Enter menu **Service\Technician\Measurement\Gain**.

The following screen is displayed (See “[Thermic adjustment window](#)”, page 2).



Diag.1 Thermic adjustment window

Reagent Heating:

- **Reference CTN value:** Input the CTN constant in this field.
- **Temperature recorded:** Allows to modify the temperature instruction.
- **Run Cycle Number:** Number of cycles to check temperature adjustment.



This control must be made with the thermal door closed and under stabilised thermic conditions (At least 5 minutes after startup).

### 1.1. Reagent heating coil temperature check

Open the thermal door on the righthand side of the instrument.

Plunge deeply the thermometer probe through the LMNE chamber's inlet 1 (See “[Reagent heating coil thermometer's sensor installation](#)”, page 2).



Diag.2 Reagent heating coil thermometer's sensor installation



Make sure the thermometer sensor is deeply plunged into the liquid.

After thermometer probe is installed, close the thermal door.

Enter in **Run Cycles Number** field (in the **Reagent heating** area of the window), 5 cycles to run.

Press **Check Thermic** (in the **Reagent heating** area of the window) button to start control.

At every «bip» your ear from the machine, check the temperature is around **35°C ±1°C**.

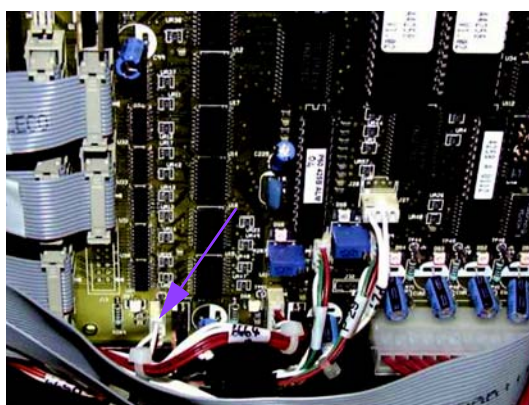


Check is validated if you get during control at least 10 times the right temperature.

If an adjustment is necessary, when heating block has been changed for example, perform the following point of this procedure.

## 1.2. Reagent heating coil temperature adjustment

Check and eventually change the CTN value (See “**Main Board Reagent heating coil CTN value**”, page 3).



Diag.3Main Board Reagent heating coil CTN value



The Heating coil CTN value is located on the CTN wire, close to the main board, connected on J31. Be sure to read the correct value as the sticker may be up or down.

Adjust, as described for the control, the temperature by the mean of the **Temperature recorded** value in the **Thermic adjustment** window (See “**Thermic adjustment window**”, page 2).

**Temperature recorded** value (in the **Reagent heating** area of the window) must be rounded (ex.: 34,35,36...):

- If **Temperature recorded** is increased, reagents preheating temperature increases.
- If **Temperature recorded** is decreased, reagents preheating temperature decreases.

Make a Reagent heating coil check after the adjustment as described at the beginning of the procedure.

If required change the **Temperature recorded** value (in the **Reagent heating** area of the window) and check temperature again until you get an acceptable temperature.

## 2. Thermostatic compartment temperature check and adjustment

### 2.1. Thermostatic compartment temperature check

Start the instrument

Enter menu **Service\Technician\Measurement\Gain**.

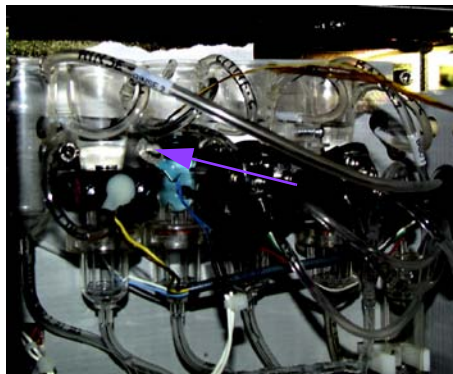
The Thermic adjustment window is displayed (See “**Thermic adjustment window**”, page 2).



This control must be made with the thermal door closed and under stabilised thermic conditions (At least 5 minutes after startup).

Open the thermal door on the righthand side of the instrument.

Put the thermometer sensor in the CTN sensor (See “Thermostatic compartment thermometer’s sensor installation”, page 4).



Diag.4 Thermostatic compartment thermometer’s sensor installation

After thermometer probe is installed, close the thermal door.

Enter in **Run Cycles Number** field (in the **Thermostatic compartment** area of the window), 5 cycles to run.

Press **Check Thermic** (in the **Thermostatic compartment** area of the window) button to start control.

At every «bip» your ear from the machine, check the temperature is around **35°C ±1°C**.

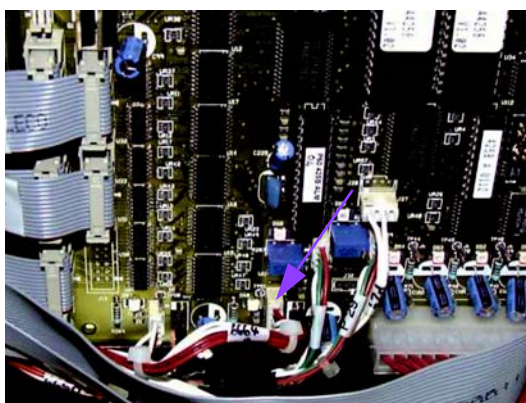


Check is validated if you get during control at least 10 times the right temperature.

If an adjustment is necessary, when heating block has been changed for example, perform the following point of this procedure.

## 2.2. Thermostatic compartment temperature adjustment

Check and eventually change the CTN value (See “Main Board Thermostatic compartment CTN value”, page 4).



Diag.5 Main Board Thermostatic compartment CTN value



The Thermostatic compartment CTN value is located on the CTN wire, close to the main board, connected on J33. Be sure to read the correct value as the sticker may be up or down.

Adjust, as described for the control, the temperature by the mean of the **Temperature recorded** value in the **Thermic adjustment** window (See “Thermic adjustment window”, page 2).

**Temperature recorded** value (in the **Thermostatic compartment** area of the window) must be rounded (ex.: 34,35,36...):

- If **Temperature recorded** is increased, reagents preheating temperature increases.

- If **Temperature recorded** is decreased, reagents preheating temperature decreases.

Make a Thermostatic compartment temperature check after the adjustment as descibed at the previously in this procedure.

If required change the **Temperature recorded** value and check temperature again until you get an acceptable temperature.



## Vacuum Adjustment Procedure

RAS334B



- Concerns

Counting and draining 1 & 2 syringes vacuum control and adjustment

- Required tools

- Allen keys
- Barflex
- Flat screws drivers

- Required products

None

- Intervention time

15 min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Draining syringe vacuum check (No adjustment available).

### 1.1. Draining syringe 1.

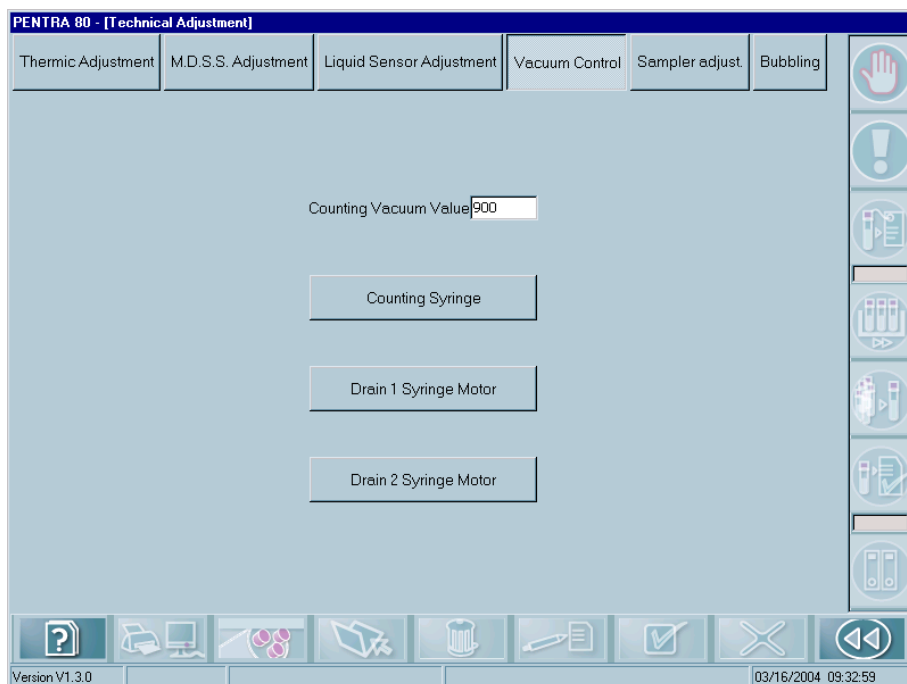
Remove cover (See RAS342 procedure).

Disconnect the tube on the draining syringe 1 (inlet 1) and replace it by the Barflex tube. (See Diag.1 “Draining syringe 1”, page 2).



Diag.1 Draining syringe 1

Enter **Menu\Service\Menu Technician\Gains\Vacuum control**. (See Diag.2 “Vacuum control”, page 2).



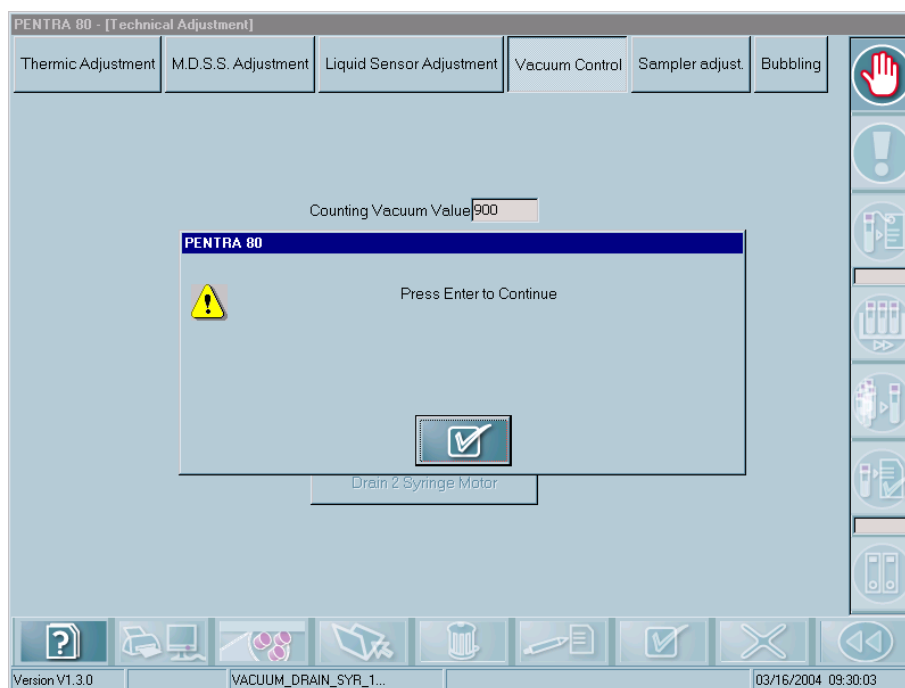
Diag.2 Vacuum control

Press «**Draining syringe 1**»

Check vacuum on the Barflex, vacuum must be **stable** during 30 secondes.

Press **OK** button (See Diag.3 “Validate”, page 3).





Diag.3 Validate

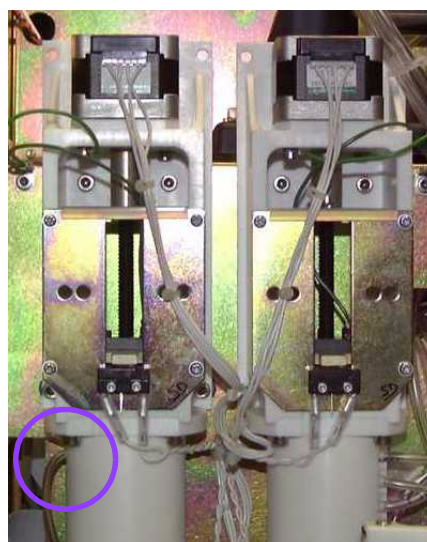
Disconnect the Barflex and connect the tube back on the draining syringe 1.



If vacuum is not stable or too low, check vacuum circuit (tubings, valves, syringe or O'ring) and repair if necessary.

## 1.2. Draining syringe 2.

Disconnect the tube on the draining syringe 2 (inlet 1) and replace it by the Barflex tube. (See Diag.4 "Draining syringe 2", page 3).



Diag.4 Draining syringe 2

Enter **Menu\Service\Menu Technician\Gains\Vacuum control**. (See Diag.2 "Vacuum control", page 2).

Press «**Draining syringe 2**»

Check vacuum on the Barflex, vacuum must be stable during 30 secondes.

Press **OK** button (See Diag.3 "Validate", page 3).

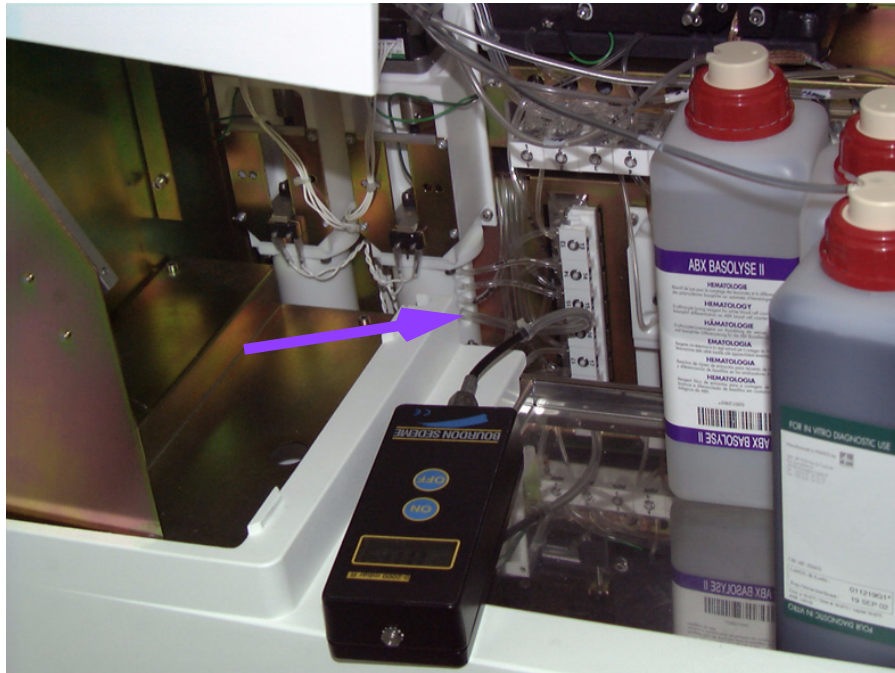
Disconnect the Barflex and connect the tube back on the draining syringe 2.

## 2. Counting syringe vacuum check and adjustment.

### 2.1. Counting syringe vacuum check.

Remove cover (See RAS342 procedure).

Disconnect the lowest tube (inlet 4) on the counting syringe and replace it by the barflex tube. (See Diag.5 “Counting syringe”, page 4).

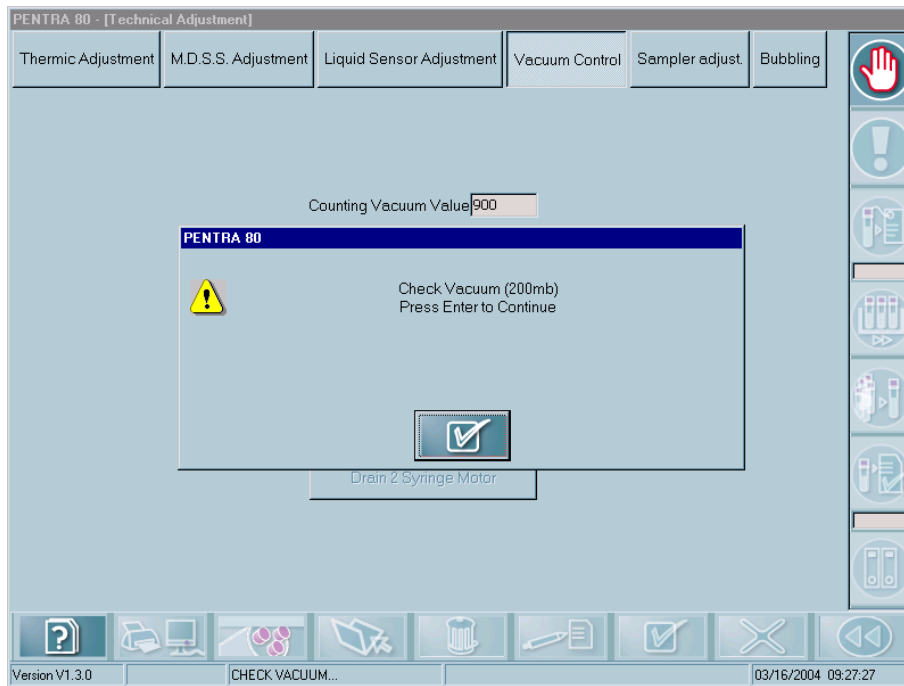


Diag.5 Counting syringe

Enter **Menu\Service\Menu Technician\Gains\Vacuum control**. (See Diag.2 “Vacuum control”, page 2).

Press «**Counting syringe**».

Check vacuum on the Barflex while the following screen is displayed. (See Diag.6 “Check and validate”, page 5), Vacuum must be at 200mb.



Diag.6 Check and validate

Press **OK** button.

Disconnect the Barflex and connect the tube back on the counting syringe.

## 2.2. Counting syringe vacuum adjustment.

Follow the «Counting syringe vacuum check» procedure (See above).

Change the **Vacuum value** (motor step). If vacuum is too low, increase step value.

Repeat vacuum check and step value adjustment until you get the correct vacuum (200mb).

Disconnect the Barflex and connect the tube back on the counting syringe.



## Bubbling Adjustment Procedure



- Concerns

Bubbling adjustment.

- Required tools

None

- Required products

None

- Intervention time

15 min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

Bubbling is factory adjusted and normally does not required further adjustment.  
If an adjustment is necessary, follow this procedure.

Enter **Menu\Service\Menu Technician\Gains\Bubbling** (See Diag.1 “Bubbling”, page 2).

PENTRA 80 - [Technical Adjustment]

Thermic Adjustment M.D.S.S. Adjustment Liquid Sensor Adjustment Vacuum Control Sampler adjust Bubbling

First Dilution 300

LMNE 300

WBC/BASO 300

RBC/PLT 300

HGB 400

Accept Values

Version V0.33 04/25/2002 15:54:25

Diag.1 Bubbling

Enter new step value for each bubbling, and click «Accept Values».



To increase bubbling, increase the number of steps.  
To decrease bubbling, decrease the number of steps.

Bubbling	Low limit	Normal	Hight limit
FIRST DILUTION	100	300	400
LMNE	100	300	400
WBC/BASO	100	300	400
RBC/PLT	100	300	400
HGB	300	400	500

## LMNE Flowcell Adjustment Procedure

RAS336B



- Concerns

Instrument adjustment : LMNE Flowcell

- Required tools

- Allen keys
- Flat screw driver

- Required products

- Latex
- Fresh blood sample
- Calibrator

- Intervention time

1h

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. LMNE Flowcell adjustment check.

This adjustment procedure must be carried out when LMNE flowcell is moved or replaced, or when LMNE tube is changed. No adjustment is required when LMNE lamp is replaced.

Enter : **Menu /Service/Menu technician/Measurment/LMNE adjustment** allows the adjustment of the entire optical bench parameters. A 1/400th dilution of RBC/PLT latex is prepared (5µl of Latex, 1ml of diluent, 1ml of eosinofix) in the LMNE chamber. This dilution is then transferred toward the optical chamber and injected.

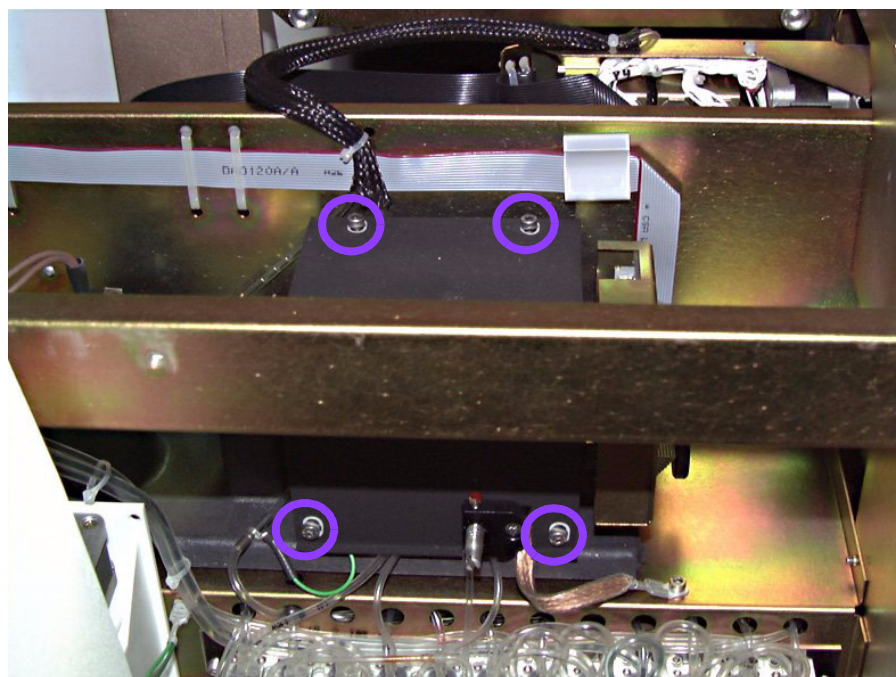
The measurments are continuously displayed every 700ms during a total of 27 seconds.



Never dismantle Emission gun or even unlock it. The adjustment is factory made and cannot be performed in the field.

Remove the cover (See RAS342).

Unscrew the cover of the optical bench (See Diag.1 “Optical bench cover”, page 2).

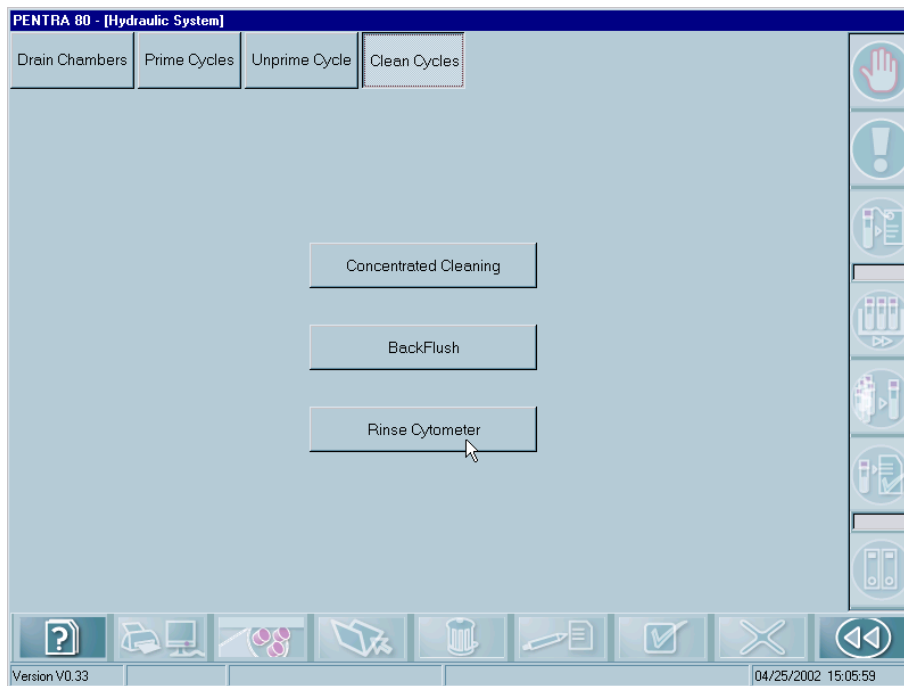


Diag.1 Optical bench cover

Run a **Rinse cytometer** cycle to get ride of air bubbles stuck to the inner optical surfaces.

Enter : **Menu/Menu Superuser/Hydraulic/Clean cycle/Rinse cytometer** (See Diag.2 “Clean cycle”, page 3).

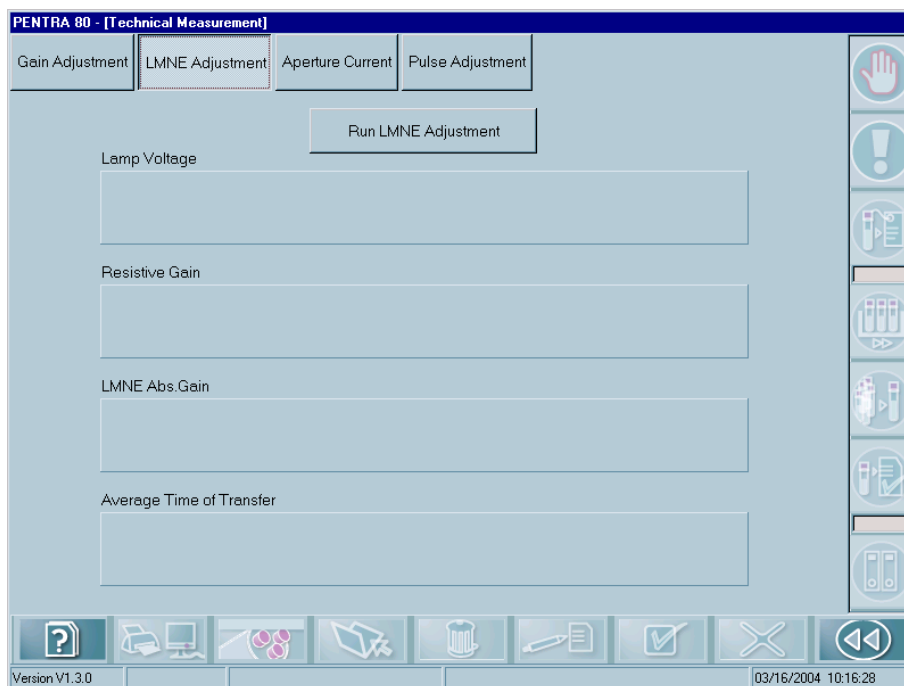




Diag.2 Clean cycle

Check that the flowcell contains no or just a very few air bubbles.

Enter : **Menu/service/menu technician/measurment/LMNE adjustment** (See Diag.3 “**LMNE adjustment**”, page 3)

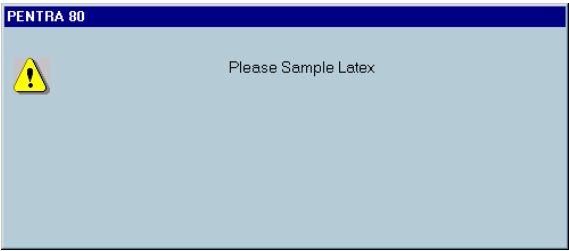


Diag.3 LMNE adjustment

Mix the RBC/PLT latex thoroughly.

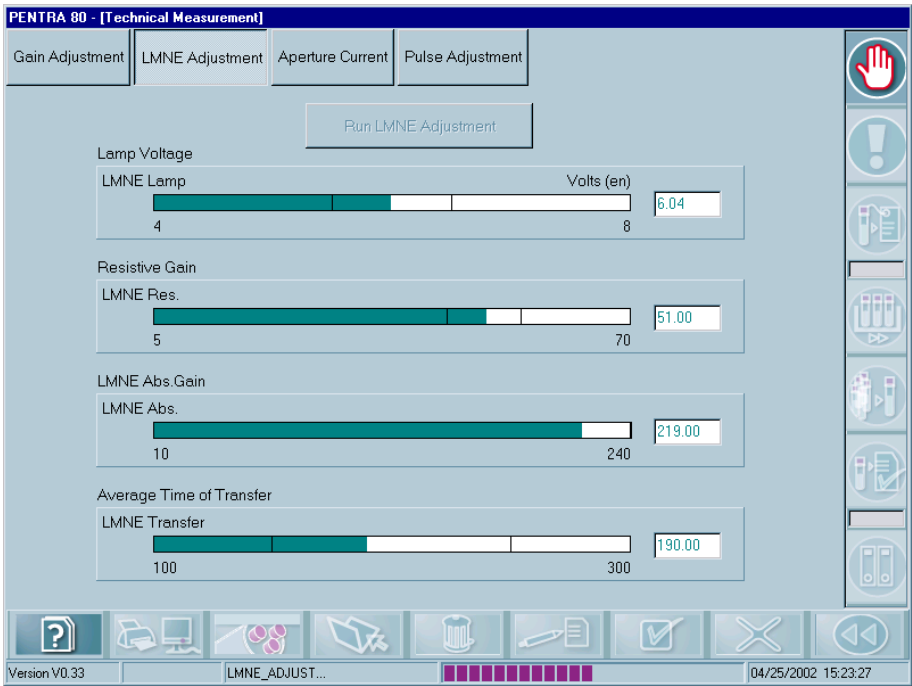
Click on «**Run LMNE Adjustment**» button.

Closed tube holder when the following screen appears :(See Diag.4 “**Sample the latex**”, page 4).



Diag.4 Sample the latex

When optical bench is well adjusted : (See Diag.5 “LMNE adjustment screen”, page 4)



Diag.5 LMNE adjustment screen

Check that the displayed values are within the range.(See Table 1: “TARGET VALUES”, page 4).

Table 1: TARGET VALUES

PARAMETER	TARGET VALUE	RANGE
LMNE Lamp	6.00V	5.50 to 6.50
LMNE res.	50	45 to 55
LMNE Abs.	170	Set to maximum
LMNE Transfer	200ms	150 to 250

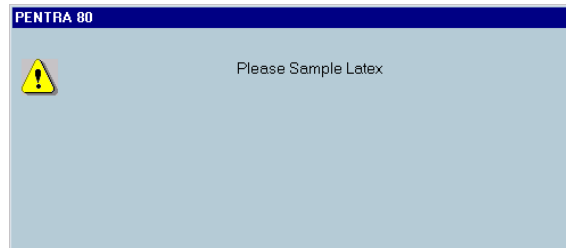
If the values are out of range or to get a better adjustment, follow the LMNE flowcell adjustment procedure.

## 2. LMNE Flowcell position adjustment

Enter : **Menu/service/menu technician/measurment/LMNE adjustment.**

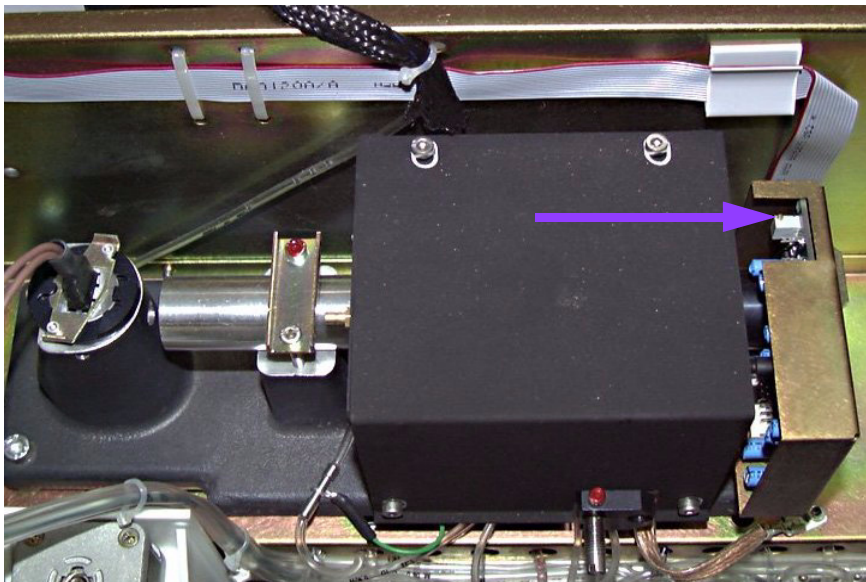
Click on «**Run LMNE Adjustment**» button.

Closed tube holder when the following screen appears :(See Diag.6 “**Sample the latex**”, page 5)



Diag.6 Sample the latex

During the cycle, adjust **LMNE lamp voltage** around 6V by turning **R414** potentiometer, located on optical bench board.(See Diag.7 “**Optical bench board**”, page 5)

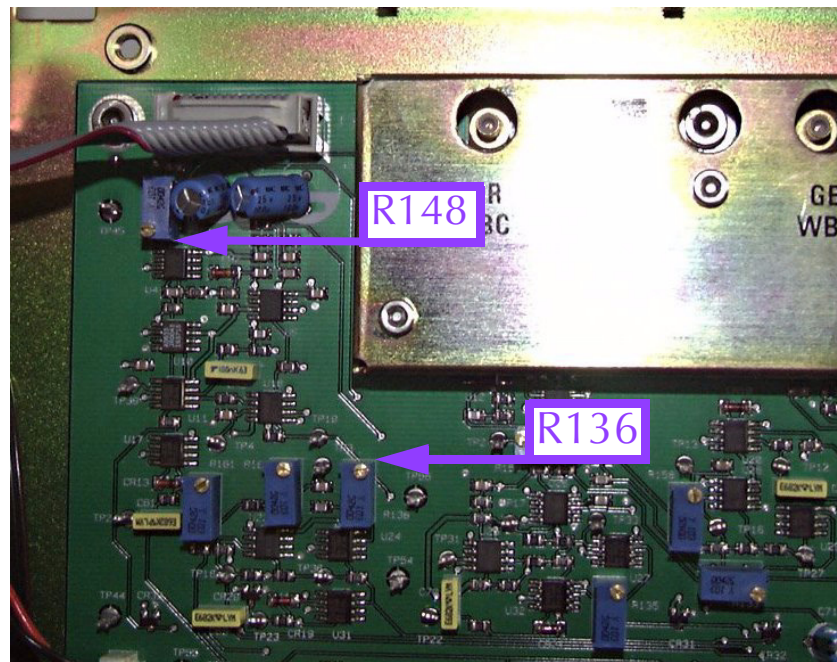


Diag.7 Optical bench board



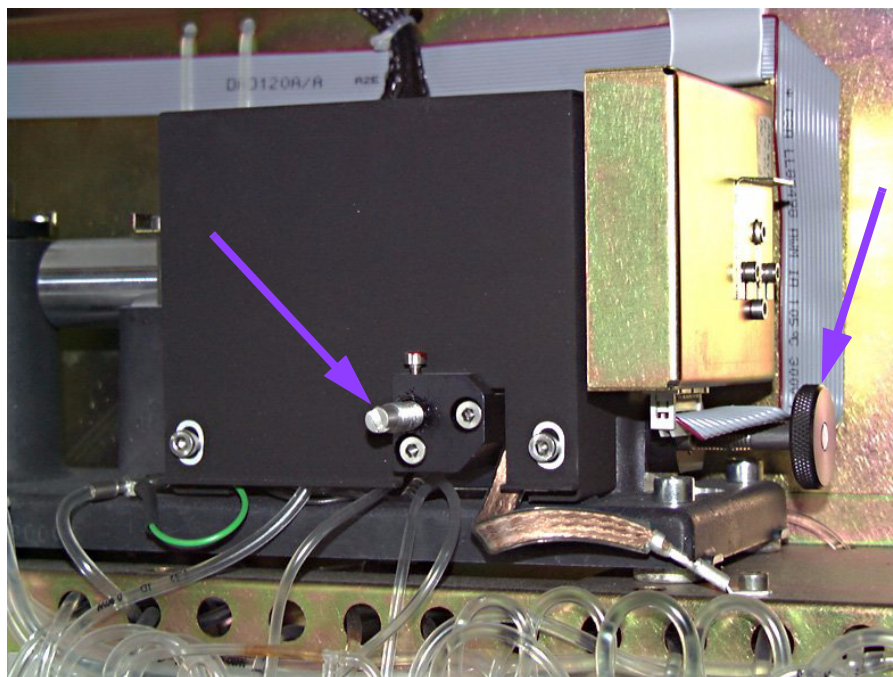
Test points on optical bench board, near R414 potentiometer , can be used to check 6V with a voltmeter.

Adjust **Resistive gain** (LMNE RES) to 50 by turning **R136** located on mother board (See Diag.8 “**Mother board**”, page 6).



Diag.8 Mother board

Adjust **Optical gain** (LMNE ABS) to the maximum (and above 170).  
Adjustment is made by lateral or axial reception gun movement, use toothed wheel and lateral screw (See Diag.9 “Optical bench adjustment”, page 6).



Diag.9 Optical bench adjustment



If you have difficulties to adjust Absorbance, you can increase gain with **R148** potentiometer (See Diag.8 “Mother board”, page 6). Once you get the highest optical adjustment, decrease slowly gain (R148) to get a correct optical gain adjustment with normal fresh blood.

Check that **Transfer time** is in limits of range.

Transfer time is not adjustable and must be between 150 and 250.



Transfer time bargraph is used to ensure the correct Right/Left location of the light rectangle in the flowcell. When the optimal value is reached, the transfer time is around 200 because of the constant height between guns alignment and flowcell.

This height is guaranteed by the washer under the flowcell, always put them back even when the flowcell is replaced by a new one.

Put the Optical bench cover back.



After intervention, check with normal fresh blood that you have a correct matrix.



## LMNE Balance Adjustment Procedure

RAS337B



- Concerns

LMNE Balance calibration and forced calibration

- Required tools

None

- Required products

Fresh and normal blood samples (5 different samples at least)

- Intervention time

15min

- Frequency

On request

- Specific kit or consumables

None

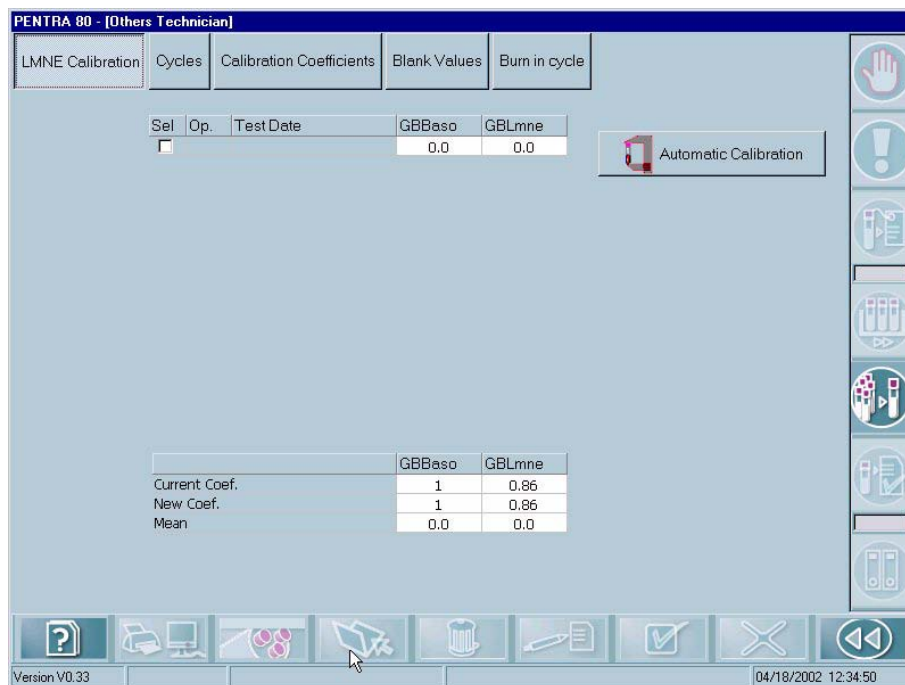


Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.



This procedure must be performed on a clean instrument.  
If the instrument is suspected to not be perfectly clean, perform a Concentrated cleaning.

Enter Menu : **Service/Menu technician/others/LMNE calibration.**(See Diag.1 “LMNE menu”, page 2)



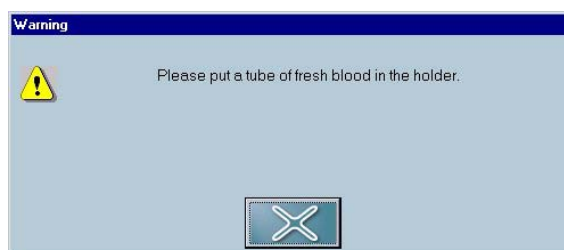
Diag.1 LMNE menu

Prepare a minimum of 5 different human blood samples without WBC alarm.  
Press on «**Stat mode**» button (See Diag.2 “Stat mode button”, page 2)



Diag.2 Stat mode button

When the following screen appears (See Diag.3 “Fresh blood tube”, page 2), put one of the tube and close the tube holder.



Diag.3 Fresh blood tube

When the analysis cycle ends, the first result is displayed on the result chart table.  
When the tube holder is open, run an other specimen, and so until you get a minimum of 5 different results.

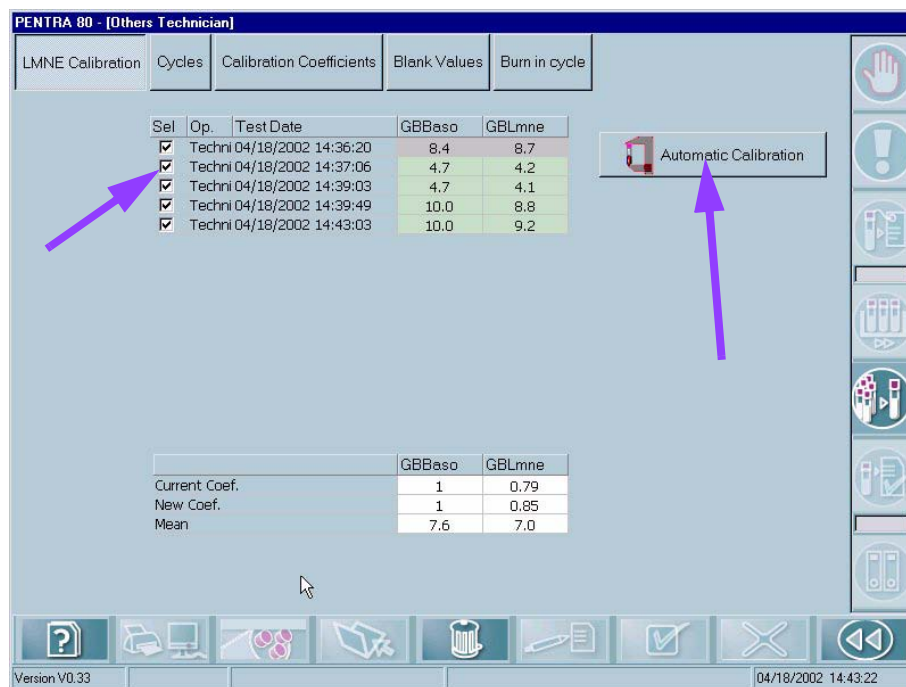




At least 5 results are necessary to calibrate the LMNE balance.

Select results to be involved in the statistical calculation by clicking the checked box in «Sel» column (See Diag.4 “Old coef”, page 3).

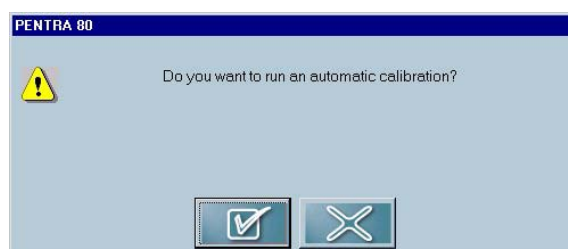
To discard a result from the statistical calculation, click the checked box again to remove the mark.



Diag.4 Old coef

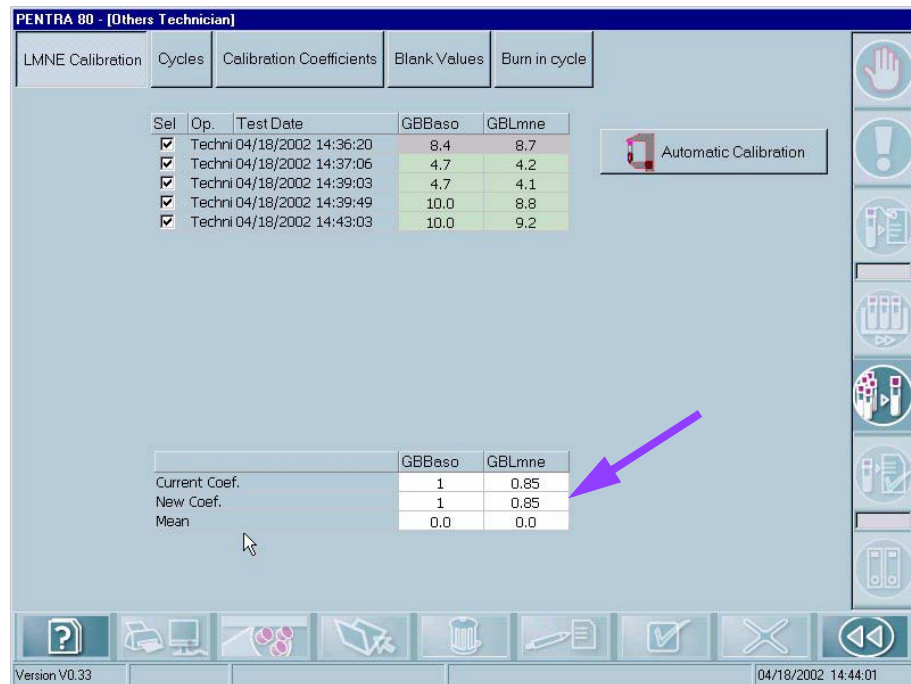
Click on «**auto calibration**» button (See Diag.4 “Old coef”, page 3) to apply new calibration coefficient.

When the following screen appears, click on «**OK**» button (See Diag.5 “Auto calibration screen”, page 3).



Diag.5 Auto calibration screen

New LMNE Balance coefficient is applied to the instrument (See Diag.6 “New coef”, page 4).

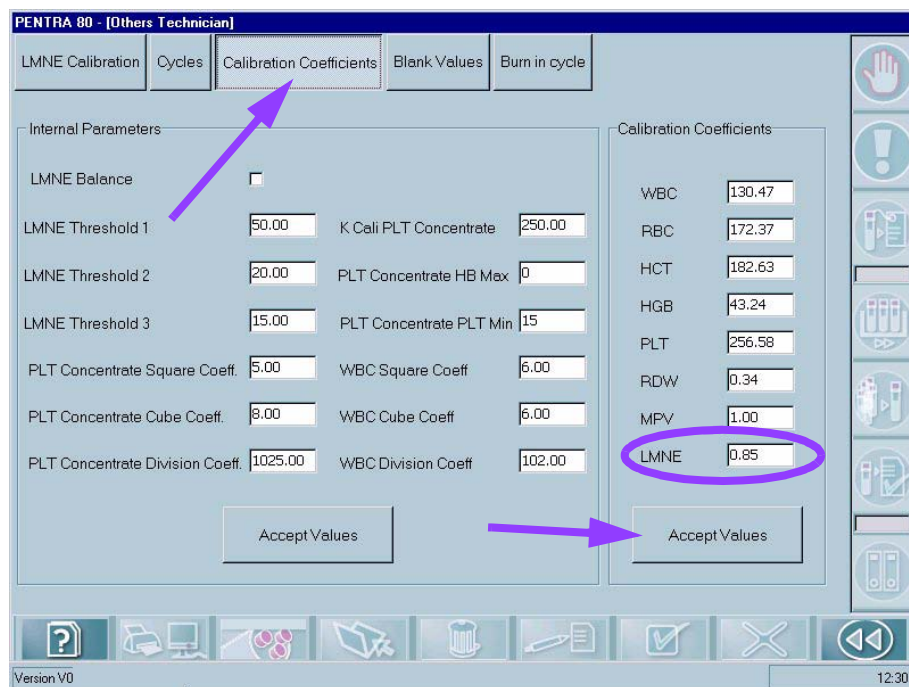


Diag.6 New coef



LMNE balance coefficient can be modified in the software.

Press «Calibration coefficients» button, change LMNE value, then press «Accept Values» button (See Diag.7 “Calibration coefficients”, page 4).



Diag.7 Calibration coefficients

## Tube holder adjustment Procedure

RAS338B



- Concerns

- Tube holder general view
- Tube holder assembly replacement
- Tube holder adjustments
- Needle adjustment
- Adjustment check
- Compatible tube list

- Required tools

- Allen keys
- Flat screwdriver

- Required products

None

- Intervention time

1h.

- Frequency

On request

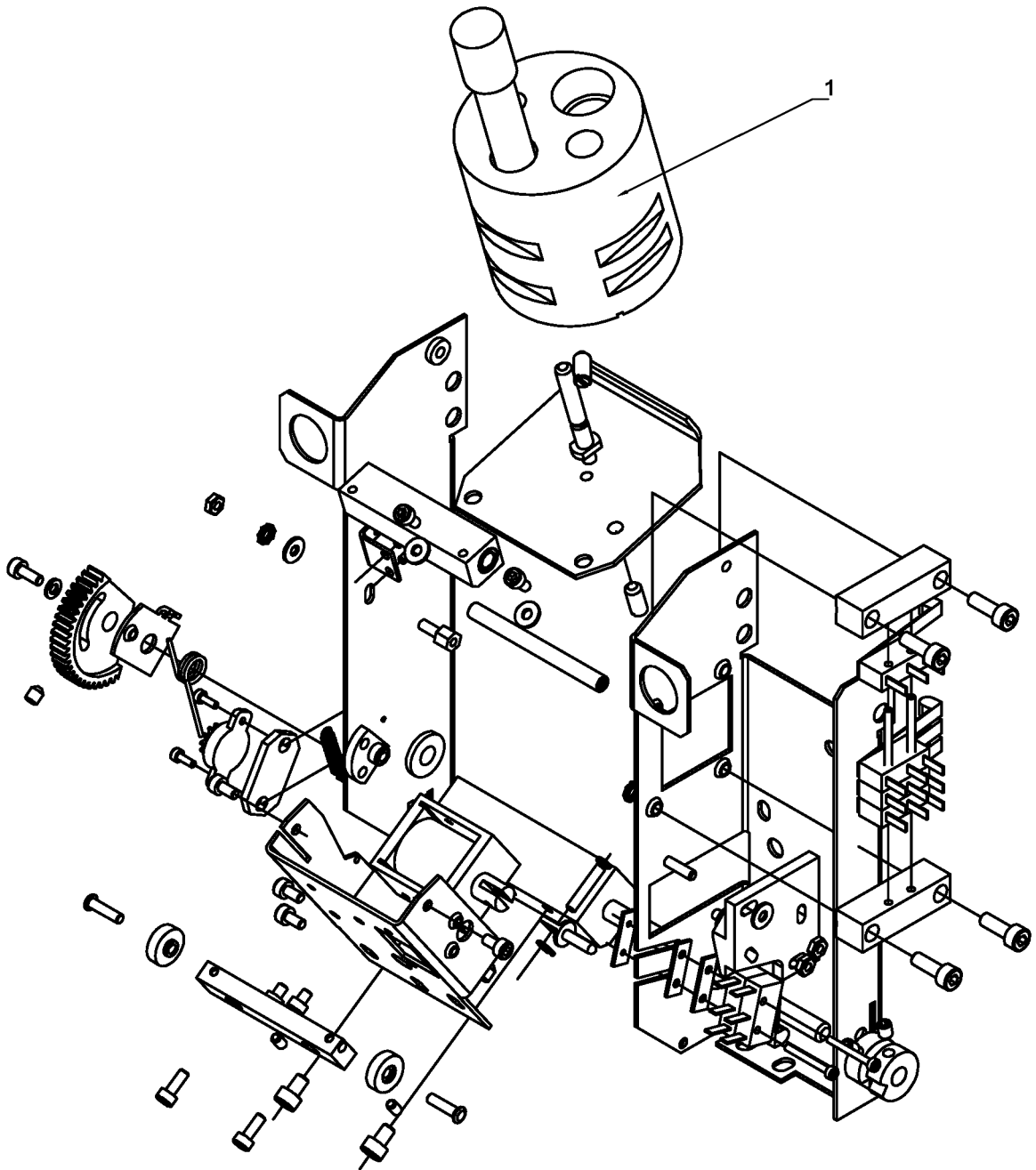
- Specific kit or consumables

Tube holder assembly: **XDA728A**



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Tube holder general view



*Diag.1 Tube holder exploded view*

## 2. Tube holder assembly replacement

Switch the instrument off.

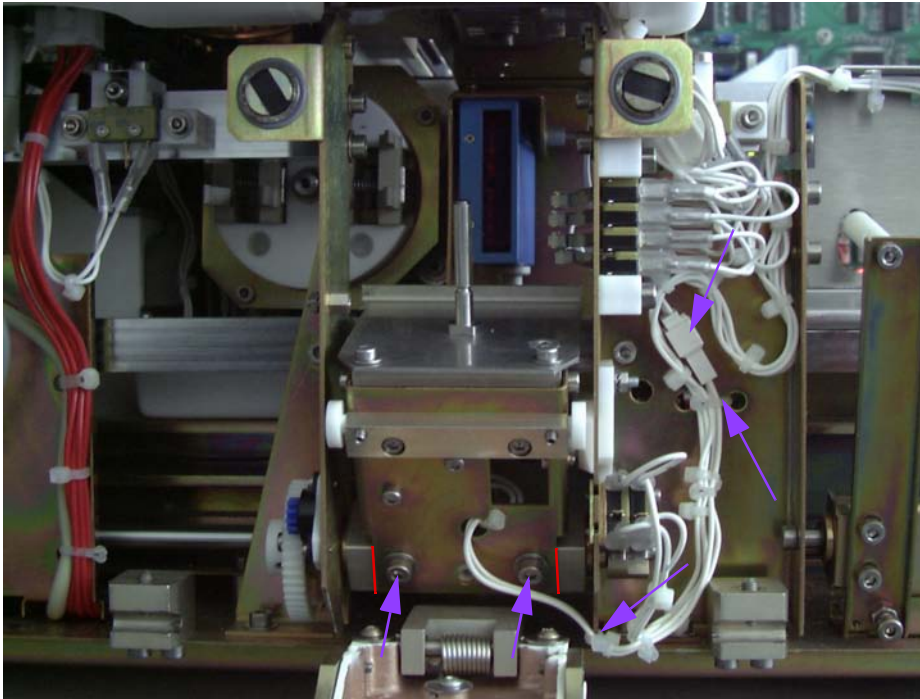
Remove the 2 front doors.

Push electromagnet axis to free and open the tube holder, remove the tube holder.

Cut the 2 tyrapes and disconnect the electro-magnet command (See Diag.2 "[Tube holder dismantling](#)", page 3).

Before dismantling the tube holder, mark with a pen the location of the tube holder support (Example: Red lines, See Diag.2 "[Tube holder dismantling](#)", page 3)

Unscrew the 2 fixation screws (See Diag.2 "[Tube holder dismantling](#)", page 3).



Diag.2 Tube holder dismantling

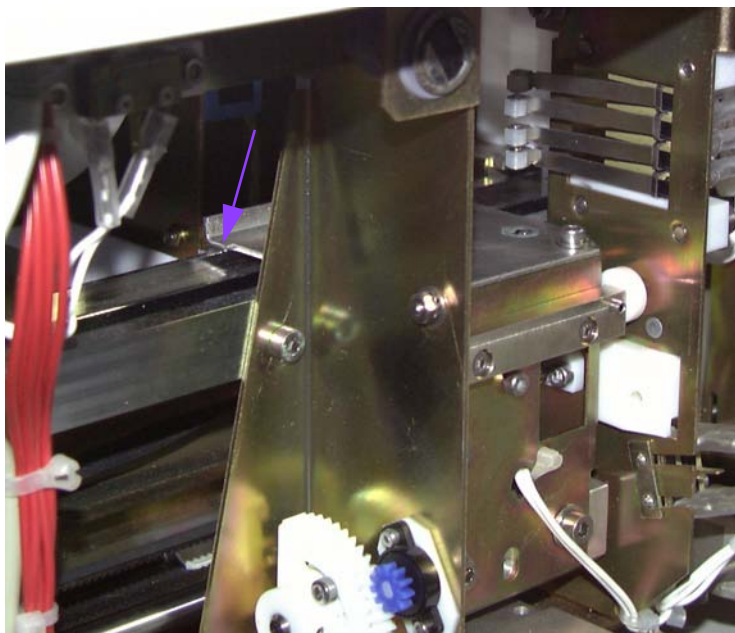
Remove the tube holder assembly.

Install the new tube holder assembly at the same place (Use the marks previously done).

Tight gently tube holder fixations screws.

Plug the electro-magnet command connector and replace the tyraps.

Close the tube holder to sampling position and check the tube holder axis support touch the rail behind (See Diag.3 "Tube holder pre-adjustment", page 3).



Diag.3 Tube holder pre-adjustment

If necessary adjust, by the mean of the 2 screws (See Diag.2 "Tube holder dismantling", page 3), the position of the tube holder assembly to get a correct adjustment.

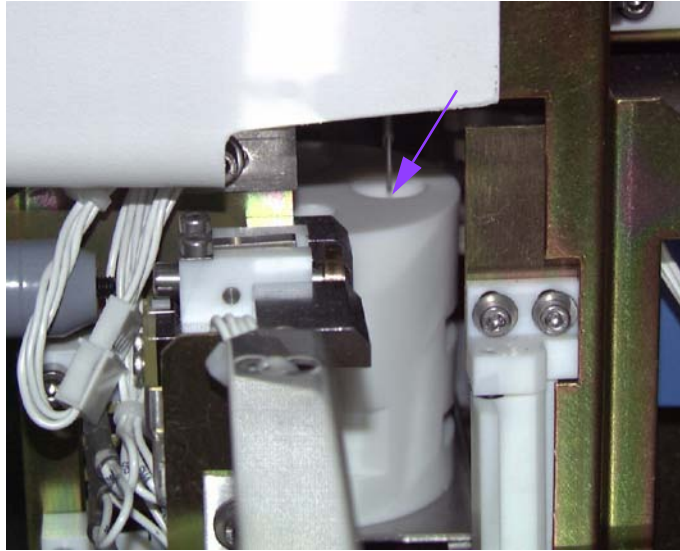


### 3. Tube holder adjustments

Switch the instrument on and log as «technician».

From menu: **Services\Technician menu\Gains\MDSS Adjustment\Holder Adjustment**, press **Control** button.

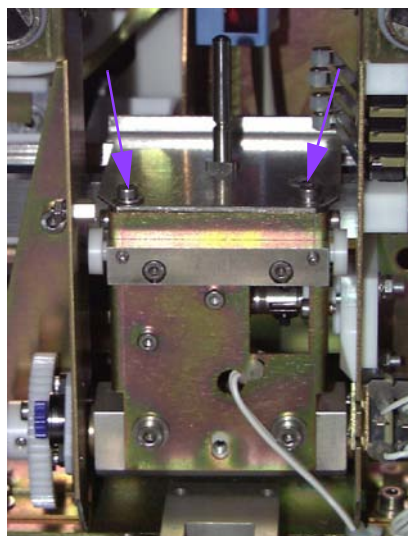
Put the tube holder back then close the door and check that the needle is correctly centered inside one of the tube holder's sampling hole (Position 1 for example).



*Diag.4 Tube holder centering check*

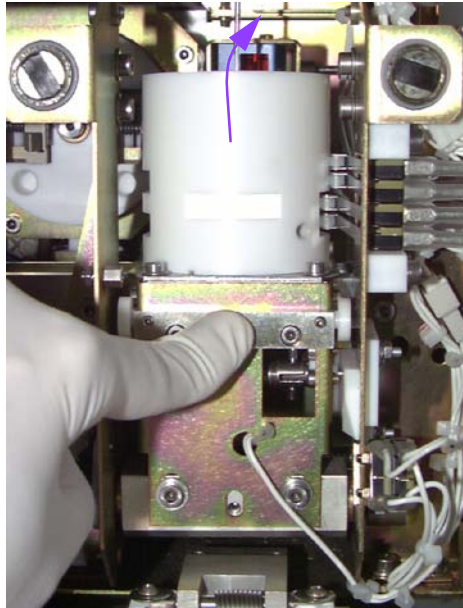
If not adjust the tube holder position as follows:

- Untight the 2 screws of the tube holder axis support (See Diag.5 "Tube holder centering adjustment", page 4).
- Adjust the tube holder axis support in order to get a correct position of the tube holder and the needle.
- When done gently tight the 2 screws (See Diag.5 "Tube holder centering adjustment", page 4).
- Open the tube holder.
- Finally tight the 2 screws (See Diag.5 "Tube holder centering adjustment", page 4) and check adjustment again. Repeat until you get a correct adjustment.



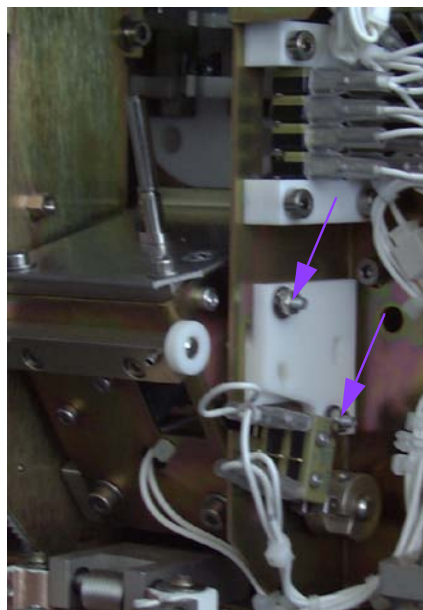
*Diag.5 Tube holder centering adjustment*

The tube holder must have a little play (about 1mm.) after the sampling position, if not the tube holder may not open correctly, check the presence of this play (See Diag.6 "Tube holder play adjustment", page 5).



Diag.6 Tube holder play adjustment

If necessary adjust tube holder's locker to get a correct play (See Diag.7 "Tube holder locker", page 5).



Diag.7 Tube holder locker



Without this play, because of the tube's cap, the tube holder may not open correctly.

Tight the locker screws when adjustment is correct.

#### 4. Needle adjustment



If the Teflon part of the needle comes into contact with the tube holder, the needle will be damaged.

When the adjustment of the tube holder is completed, adjust the **Tube Holder Position** to get a correct needle sampling position.

From menu: **Services\Technician menu\Gains\MDSS Adjustment\Holder Adjustment**, press **Control** button.

- The needle moves down to the level of a tube position.
- Gently press and turn the tube holder, check that the needle nearly touch the surface of the tube holder without any contact. Turn the tube holder to its initial position.
- If the adjustment is correct, click on «OK», the needle moves up.
- If not, click on «OK», the needle moves up, modify the number of steps in the field: «Tube Holder position» (increase number of steps if the needle is above the tube holder, decrease number of steps if the needle is too low inside the tube holder).
- Click on «Accept Value» the rerun the «Control» function.

#### 5. Opening speed adjustment

From menu: **Services \ Super User \ Mechanical \ Holder adjustment**

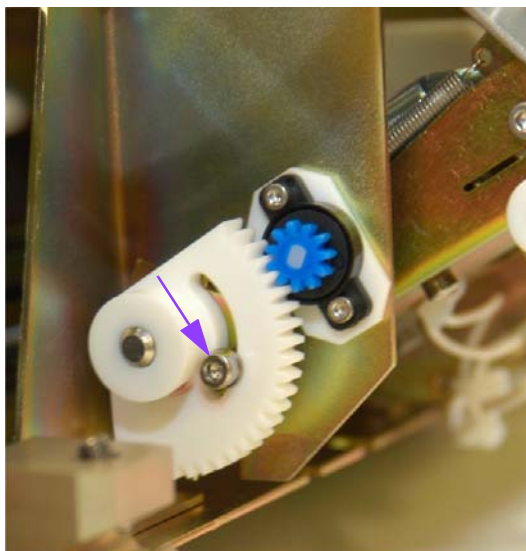
Press the «Holder Open Time» button.

Close the tube holder.

When the tube holder is opened, a value is displayed in the «Time» window.

This value must be contained between 700 and 800.

If not, adjust the spring's tightness using the CHC screw (See Diag.8«[Spring adjustment](#) », page 6) to get the correct value then repeat the same operation.



Diag.8Spring adjustment

#### 6. Adjustment check

Once all adjustments have been carried out check all the screws hadve been well tighten.

Run few samples in stat mode to check that tube holder operates correctly.



7. Compatible tube list for Tube holder

- Legend:
  - MAN: Manufacturer
  - BC: Barcode
- Tube holder position:
  - GBL0183 Standard tube holder: Position 1, position 2, position 3, position 4
  - GBL0254 optional tube holder: Position 1, position 3, position 5, position 6

Table 1: Tube holder Position 1

Manufacturer	Model	Part number	Additive	Vol.	Vacuum	Stickers	Piercing Conditions	Type of cap	Observations
Becton D	Vacutainer	368452	K3-EDTA	5ml		MAN+BC	With cap	Rubber with groove	
Becton D	Vacutainer	367651	K3-EDTA	5ml	2ml	MAN+BC	With cap	Hemogard	
Becton D	Vacutainer	367856	K3-EDTA	5ml	3ml	MAN+BC	With cap	Hemogard	
Becton D	Vacutainer	367652	K3-EDTA	5ml	3ml	MAN+BC	With cap	Hemogard	
Becton D	Vacutainer	367654	K3-EDTA	5ml	4.5ml	MAN+BC	With cap	Hemogard	
Terumo	Venoject II	VP-053SDK	K3-EDTA	5ml	3ml	MAN	With cap	Ultrasel	
Terumo	Venoject	VT-050STK	K3-EDTA	5ml	5ml	MAN	With cap	Rubber with groove	
Terumo	Venoject	VT-053STK	K3-EDTA	5ml	3ml	MAN	With cap	Rubber with groove	
CML	ABX 3004002	TH5C0C	K3-EDTA	5ml	4ml	MAN+BC	With cap	Rubber strongly not advisable	
Greiner	Vacurette	454087	K3-EDTA	5ml	2ml	MAN+BC	With cap	Hemogard	
Greiner	Vacurette	454086	K3-EDTA	5ml	3ml	MAN+BC	With cap	Hemogard	
Greiner	Vacurette	454036	K3-EDTA	5ml	4ml	MAN+BC	With cap	Hemogard	
Greiner	Vacurette	454223	K3-EDTA	5ml	4,5ml	MAN+BC	With cap	Hemogard	
LDM Paris			EDTAKE	5ml	4,5ml	MAN+BC	With cap	Hemogard	

Table 2: Tube holder Position 2

Manufacturer	Model	Part number	Additive	Vol.	Vacuum	Stickers	Piercing Conditions	Type of cap	Observations
Becton D	Vacutainer	6385	K3-EDTA	5ml		MAN	*Without cap	Rubber strongly not advisable	*Because of the cap thickness and the lack of space between the holder and the top of the tube holder may not open correctly.
Terumo	Venoject	VT-030STK	K3-EDTA	3ml	3ml	MAN	With cap	Rubber strongly not advisable	

Table 3: Tube holder Position 3

Manufacturer	Model	Part number	Additive	Vol.	Vacuum	Stickers	Piercing Conditions	Type of cap	Observations
Comar	R&D system	TX2B 18533IF		5ml	2,2ml		Without cap	with thread	

Table 4: Tube holder Position 4

Manufacturer	Model	Part number	Additive	Vol.	Vacuum	Stickers	Piercing Conditions	Type of cap	Observations
Sarstedt		901091		0,5ml			*Out of format	Unlostable	*The tube accepts a small sticker (not supplied by the manufacturer)
Kabe	ABX3001001	0777008RED		0,5ml			*Out of format	Unlostable	*The tube accepts a small sticker (not supplied by the manufacturer)

Table 5: Tube holder Position 5

Manufacturer	Model	Part number	Additive	Vol.	Vacuum	Stickers	Piercing Conditions	Type of cap	Observations
Becton D	Microtainer	365975		0,5ml		*Out of format	Without cap	**Microgard	*The tube accepts a small sticker (not supplied by the manufacturer) **Cap fitted with an adaptor (require another probe adjustment)

Table 6: Tube holder Position 6

Manufacturer	Model	Part number	Additive	Vol.	Vacuum	Stickers	Piercing Conditions	Type of cap	Observations
Becton D	Microtainer	365973		0,5ml		*Out of format	Without cap		*The tube accepts a small sticker (not supplied by the manufacturer)

## 8. Compatible tube list for rack

Manufacturer	Model	Part number	Additive	Vol.	Vaccum	Piercing conditions	Type of cap
Becton D	Vacutainer	367651	K3-EDTA	5ml	2ml	With cap	Hemogard
Becton D	Vacutainer	367652	K3-EDTA	5ml	3ml	With cap	Hemogard
Becton D	Vacutainer	367654	K3-EDTA	5ml	4.5ml	With cap	Hemogard
Becton D	Vacutainer	368452	K3-EDTA	5ml		With cap	Hemogard
Started		04-1901					
Terumo	Venoject	VT-050STK	K3-EDTA	5ml	5ml	With cap	Rubber with groove
Terumo	Venoject	VT-053STK	K3-EDTA	5ml	3ml	With cap	Rubber with groove
Greiner	Vacurette	454036	K3-EDTA	5ml	4ml	With cap	Hemogard
Greiner	Vacurette	454223	K3-EDTA	5ml	4.5ml	With cap	Hemogard

## Power supply replacement Procedure

RAS339B



- Concerns

Instrument dismantling : Power supply

- Required tools

- Hexagonal keys
- Flat screw driver

- Required products

None

- Intervention time

30 min

- Frequency

On request

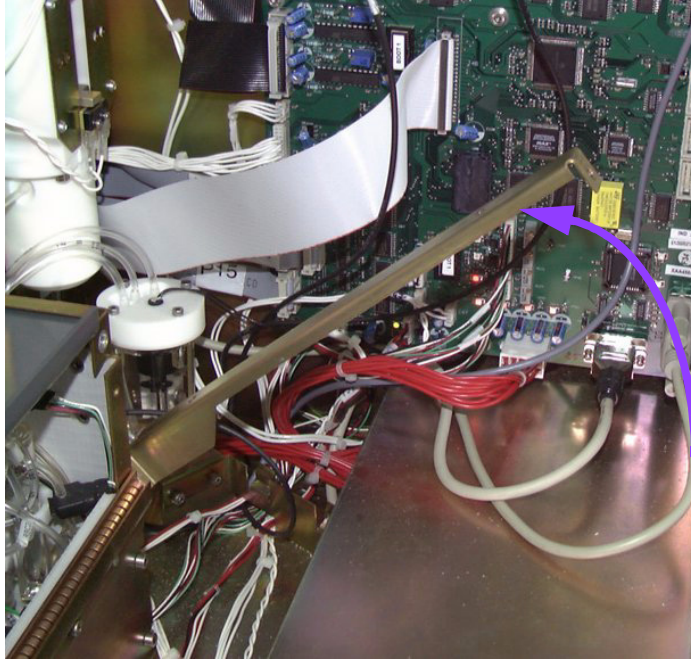
- Specific kit or consumables

Power supply : DBN006A



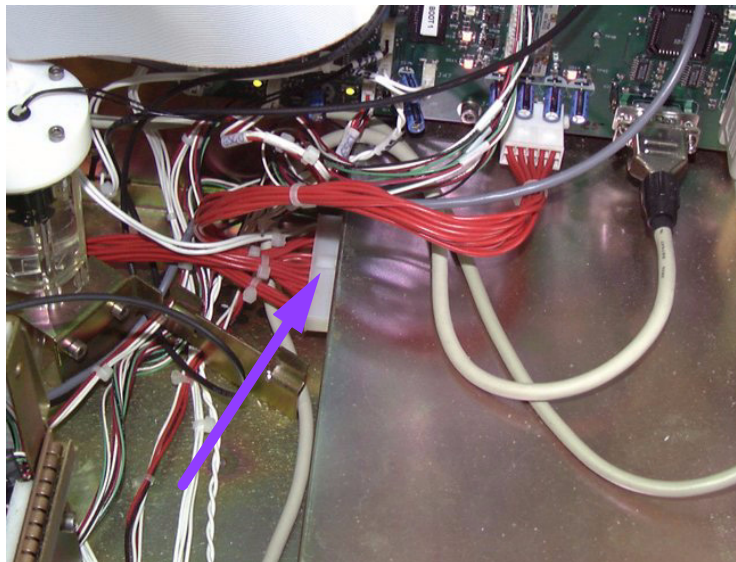
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

Switch off the instrument.  
Disconnect Power supply cable.  
Remove cover (See RAS342).  
Lift the bar up by unscrewing the right screw (See Diag.1 “Bar screw”, page 2).



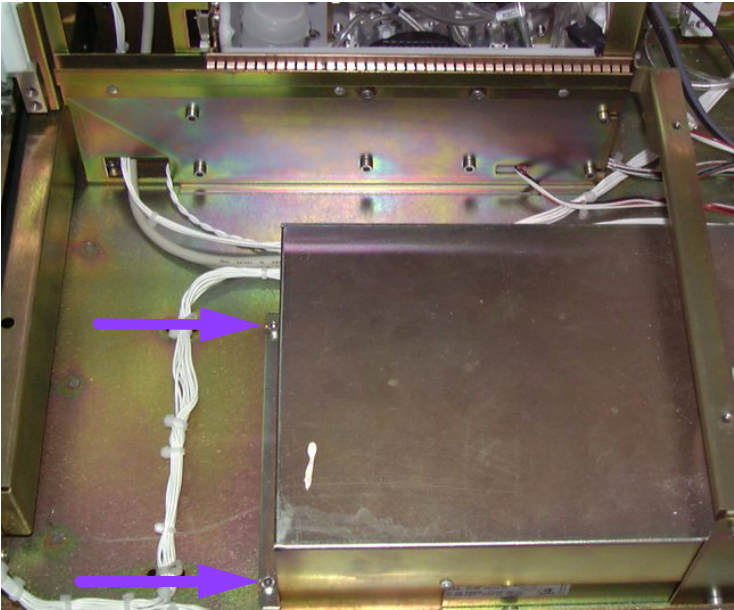
Diag.1 Bar screw

Disconnect, on the Power supply, the **supply connector** (See Diag.2 “Power supply connector”, page 2).



Diag.2 Power supply connector

Unscrew the 2 front screws of the Power supply (See Diag.3 “Power supply front screws”, page 3).



Diag.3 Power supply front screws

Unscrew the 2 back screws of the Power supply (See Diag.4 “Power supply back screws”, page 3).



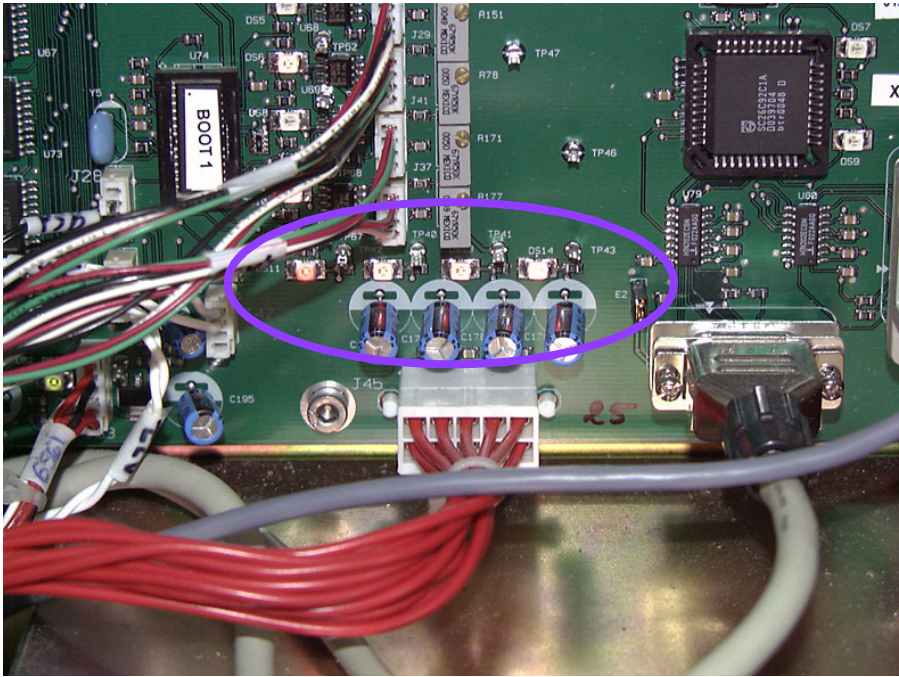
Diag.4 Power supply back screws

Remove the Power supply.  
Reassemble following previous steps backward.  
Switch on the instrument.  
Check following voltages on mother board (See Table 1: “Power supply voltages”, page 3 and See Diag.5 “Test points”, page 4).

Table 1: Power supply voltages

Test point	Designation	Target
TP40	+5V Power supply	+5V
TP41	+15V Power supply	+15V
TP42	+24V Power supply	+24V
TP43	-15V Power supply	-15V





Diag.5 Test points



## Check up after intervention Procedure

RAS340B

\_\_\_\_\_



- Concerns

Check up and control of the instrument accuracy:

- Repeatability
- Calibration
- Control

- Required tools

None

- Required products

- Fresh and normal blood samples
- Calibration blood samples
- Control blood

- Intervention time

45min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Repeatability



This procedure must be performed on a clean instrument.  
If the instrument is suspected to not be perfectly clean, perform a Concentrated cleaning.

The measurement of repeatability is based on the set of 10 results obtained from the consecutive analyses of the same blood sample.

CBC or DIF type analyses can be invoked (combination is not supported) with a limit of 35 results per test. Beyond the 35th result, data generated from new analysis will be disregarded.

To remain undisturbed the CV calculation, the potential results containing defaults generated directly from the analyses channels are rejected. In that case, a dialog box informs the user.

From **Quality Assurance Menu** menu enter **Within run** menu and run several samples in DIF mode. Check that obtained coefficients of variation are within the following limits.

Table 1: Within Run Coefficients of variation

Parameter	%CV	Test Level
WBC	<2%	at $10 \times 10^3/\mu\text{l}$
RBC	<2%	at $5 \times 10^6/\mu\text{l}$
Hgb	<1%	at 15g/dl
Hct	<1%	at 45%
Plt	<5%	at $300 \times 10^3/\mu\text{l}$

## 2. Calibration

Calibration function is used to determine the values of the calibration coefficients to calibrate the instrument with known result samples.

From **Quality Assurance Menu** press the **Calibration** button.

Select the calibrator lot number you are going to use for calibration in the left area of the window.

If the calibrator is not listed create it.

From the **Calibration Target** menu check target values are correct, if not press **Edit** button, beep your current calibrator barcode (or type in the target values supplied with calibrator leaflet in the reserved fields), then confirm by pressing **Ok** button. Exit the **Target Values** by pressing **Return** button.

Prepare the calibrator according to the specific instructions detailed in the calibrator package insert (temperature, mixing...).

Press the **Stat** mode button, open the calibrator vial and install it the tube holder.

Close the door.

When the tube holder opens, remove and recap the vial.



Risk of erroneous results if the calibrator is not continuously mixed between each analysis.  
In order to obtain a correct calibration it is recommended to run at least 5 calibrator samplings.

When the analysis cycle ends, the result is displayed on the result grid. Run the calibrator 4 more times.

**PENTRA 80 - [Calibration]**

Calibrator Name: **CALI 1**

Lot N° / Barcode: **CX319**

Expiration Date: **05/05/2002**

WBC: **9.7**  $10^9/\text{mm}^3$

RBC: **4.54**  $10^6/\text{mm}^3$

HGB: **13.4** g/dL

HCT: **36.1** %

PLT: **271**  $10^3/\text{mm}^3$

Modified On: **04/09/2002**

By: **Admin**

Sel	Op.	Test Date	WBC	RBC	HGB	HCT	PLT
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:18:26	10.1 H	4.39 L	13.3	35.3	286 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:22:18	10.7 H	4.50	13.1 L	36.4	295 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:23:14	10.3 H	4.45 L	13.2	36.3	296 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:24:32	9.2 L	4.44 L	13.3	36.2	282 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:25:30	9.7	4.38 L	13.1 L	35.7	285 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:27:11	9.4 L	4.35 L	13.2	35.5	285 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:28:29	10.1 H	4.44 L	13.3	36.1	302 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:29:55	10.2 H	4.36 L	13.0 L	35.3	285 H
<input checked="" type="checkbox"/>	Admin	04/09/2002 10:31:38	9.6	4.36 L	13.1 L	35.6	299 H

Selected Analysis: **5**

Minimum required sampling number for automatic calculation : 5

	WBC	RBC	HGB	HCT	PLT
Target Values	9.7	4.54	13.4	36.1	271
Mean	10.1 H	4.40 L	13.2	35.7	293 H
Coef. of Variation	2.66 H	1.01	0.99	1.25	2.63
Current Coef.	128.89	161.35	42.4	178.6	210.04
New Coef.	128.89	161.35	42.4	178.6	210.04

Version V0.33 | ABX | 04/18/2002 07:46:35

Diag.1 Calibration window



In the event that the result shows an analysis fault or reject, the result is not stored. An error message advising of rejection is displayed.

To discard a result from the statistical calculation, click into the **Sel** column the checked box to remove the result from the statistical calculation.

If the coefficient of variation is within the limits and the percentage difference between the target and the mean value is less than 20, instrument allows an automatic calibration. Press **Automatic calculation** button to calculate new coefficients then **Ok** button to confirm and apply new coefficients of calibration.

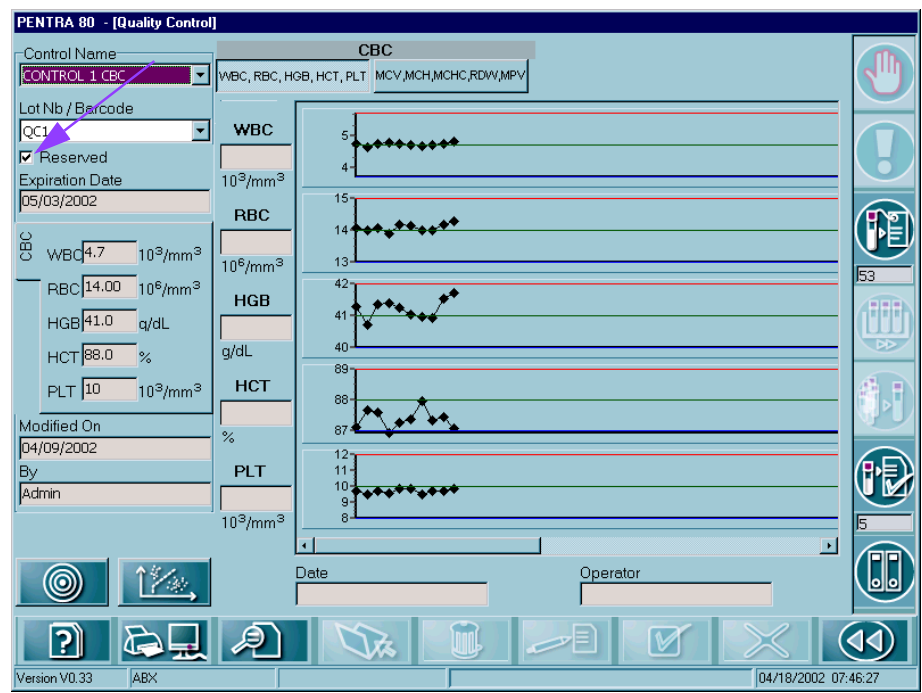


Sometimes you may have to use the forced calibration to enter new coefficients when instrument is very far from its normal range. A warning message shall request confirmation to continue, validate then perform a control of the instrument.

### 3. Control

Run several controls to check and validate the calibration. When using DIFFTROL control blood, use the floppy disk to update lot parameters.

Select the **Reserved** box to link the lot number to QC results for further analyses.



Diag.2Control window

## Optical bench Dismantling & Replacement Procedure

RAS341B



- Concerns

Optical bench:

- Dismantling
- Replacement
- Control

- Required tools

- Hexagonal keys
- Dynamometric screwdriver A302, A301, A300
- Flat screwdriver
- Torx keys

- Required products

None

- Intervention time

30min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

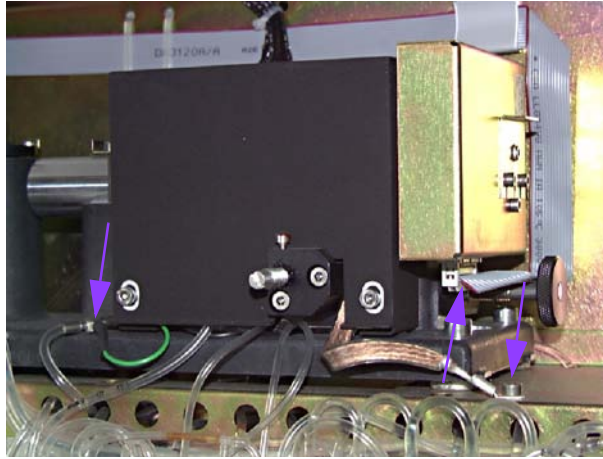
## 1. Optical bench dismantling

Switch the instrument off.

Disconnect power supply cable.

Remove the lefthand side vertical panel and the top cover to access to the optical bench.

From the Optical bench disconnect the following cables (See Diag.1 “Optical bench dismantling (Ground, Ground fitting, Signal cable)”, page 2):



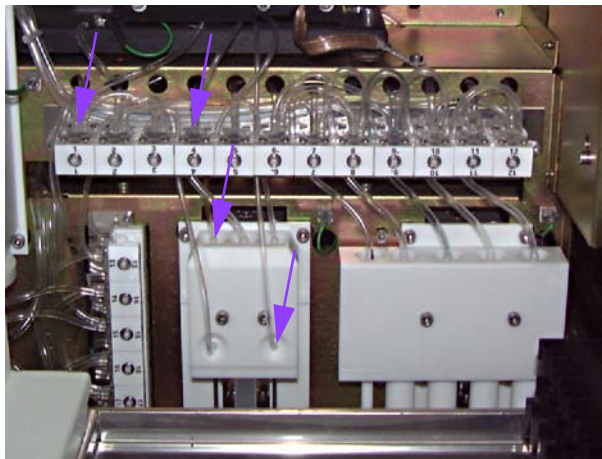
Diag.1 Optical bench dismantling (Ground, Ground fitting, Signal cable)

Disconnect tubes from LMNE syringe:

- Inlet 1
- Inlet 2

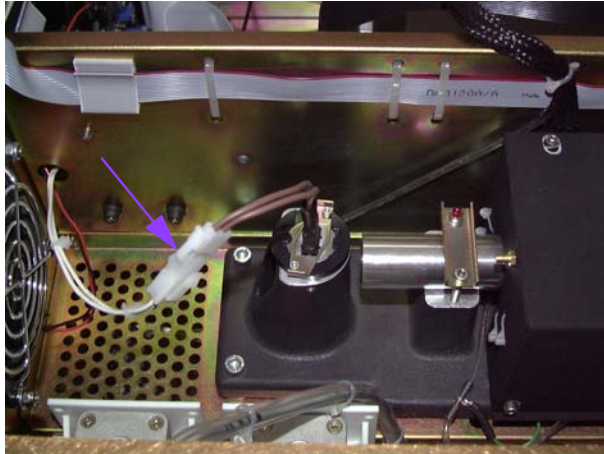
Disconnect tubes from valves:

- 1, Inlet 1
- 4, Inlet 2



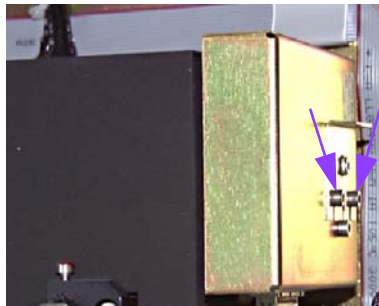
Diag.2 LMNE syringe and Valves disconnection

Disconnect the Optical bench lamp power supply connector (See Diag.3 “Optical bench lamp disconnection”, page 3).



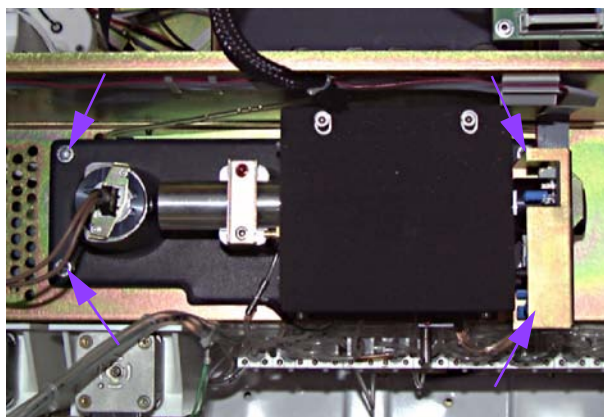
Diag.3 Optical bench lamp disconnection

Remove the Optical bench electronic board, unscrew the 2 screws maintaining the board (See Diag.4 “[Optical bench electronic board dismantling](#)”, page 3):



Diag.4 Optical bench electronic board dismantling

Untight the 4 fixation screws (silent-blocks) of the Optical bench on the frame (See Diag.5 “[Optical bench fixation screws](#)”, page 3. Optical Bench board should be removed on the picture).



Diag.5 Optical bench fixation screws

Locate the new Optical bench and tight the silent-blocks (about 4 turns).



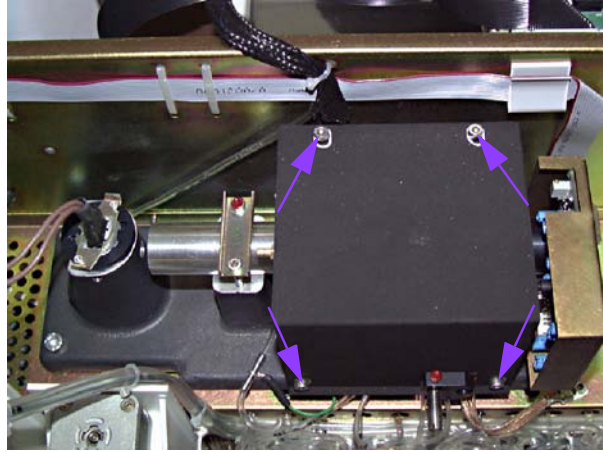
Do not tight too much the silent-blocks, check optical bench cannot be lifted.

Connect all the tubings and wirings previously disconnected in the reverse order.

## 2. Control of the Optical bench

### 2.1. Emission gun control of position

Remove the Optical bench cover (See Diag.6 “Optical bench cover dismantling”, page 4):



Diag.6 Optical bench cover dismantling

Check that gap between the emission gun and the flowcell is around 3mm. (See Diag.7 “Optical bench control”, page 4).



Be carefull not to damage the flowcell nor the emission gun with the allen key.



Diag.7 Optical bench control

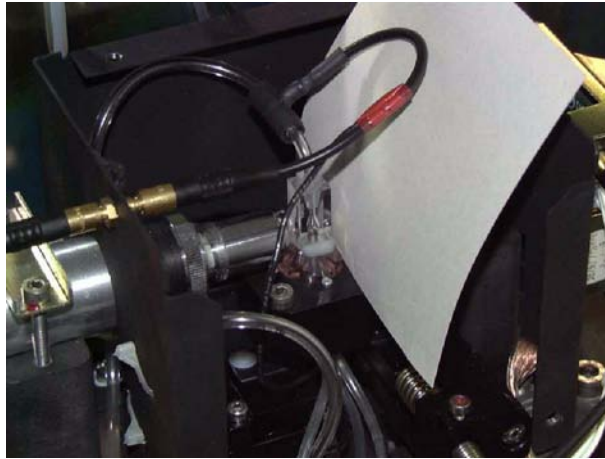


This adjustment is factory made and must not be changed.

### 2.2. Optical bench lamp alignment control

Put a piece of white paper between reception gun and flowcell (See Diag.8 “Lamp control 1”, page 5).





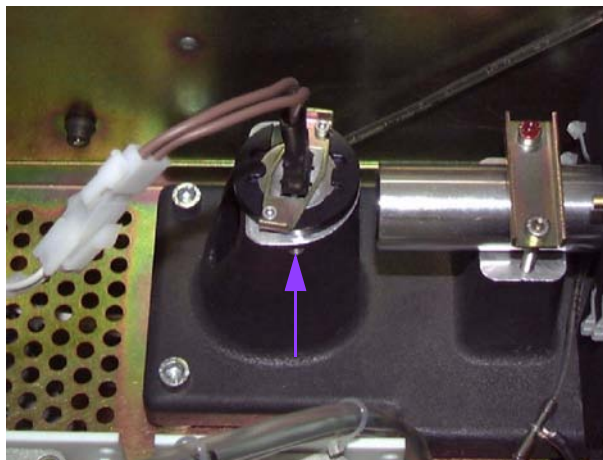
Diag.8 Lamp control 1

Check that the projection of lamp filament is vertical on the piece of paper (See Diag.9 “[Lamp control 2](#)”, page 5).



Diag.9 Lamp control 2

A small screw (1.2mm. allen key) allows adjustment of the lamp position (See Diag.10 “[Lamp adjustment screw](#)”, page 5).



Diag.10 Lamp adjustment screw



This adjustment is factory made and must not be changed.



## Front panel & covers dismantling Procedure

RAS342B

\_\_\_\_\_



- Concerns

Front panel & covers dismantling

- Required tools

- Hexagonal keys
- Flat screw driver

- Required products

None

- Intervention time

30min

- Frequency

On request

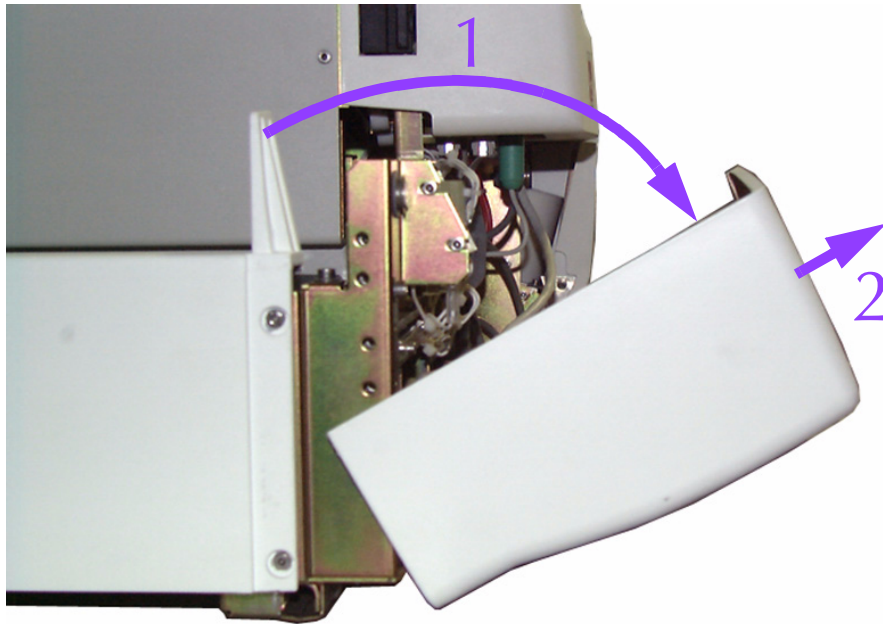
- Specific kit or consumables

None



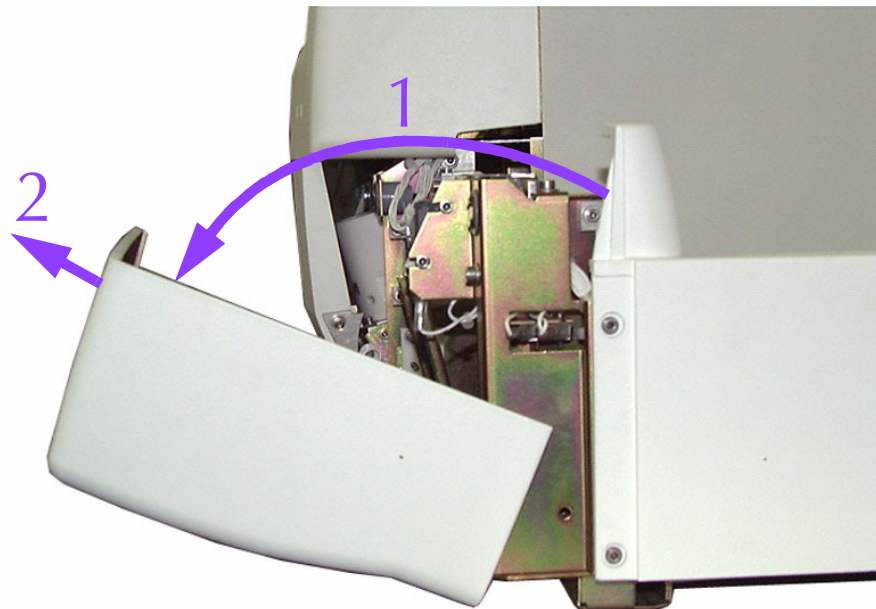
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

Switch off the instrument.  
Disconnect power supply cable.  
Pull **Front left cover** down (1), then remove it (2). (See Diag.1 "**Front left cover**", page 2).



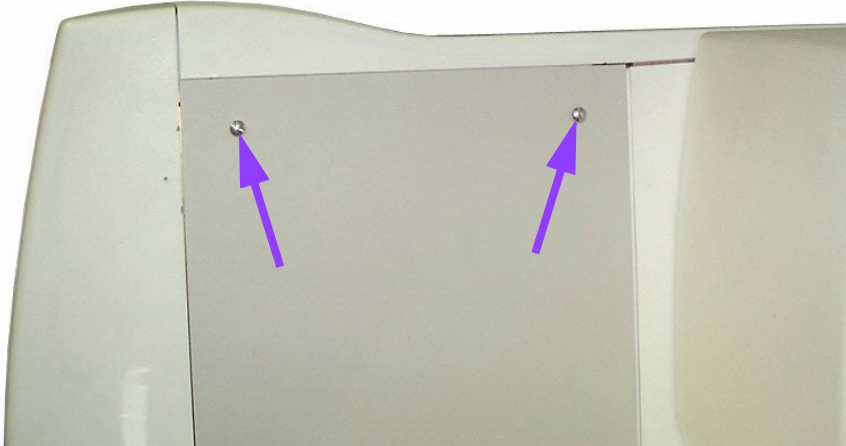
*Diag.1 Front left cover*

Pull **Front right cover** down (1), then remove it (2). (See Diag.2 "**Front right cover**", page 2).



*Diag.2 Front right cover*

Open the **Right door**, place the key inside the screw slot and turn the captive screw counterclockwise (See Diag.3 "**Right door**", page 3).

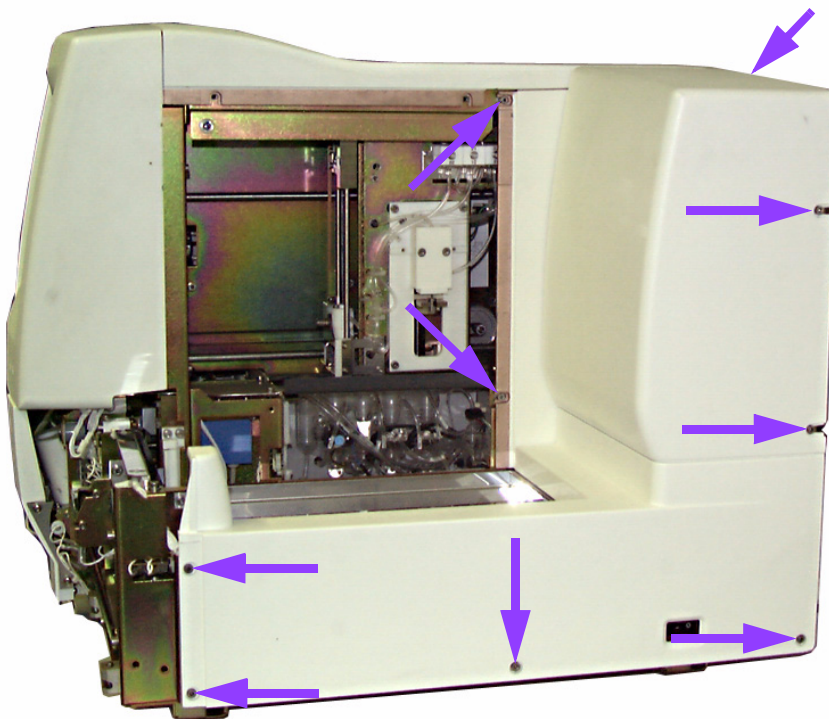


Diag.3 Right door

Remove **Right side cover** by unscrewing the 9 CHC M4X8 (See Diag.4 "**Right side cover**", page 3).



One of the screws is at the rear of the instrument, with a washer.

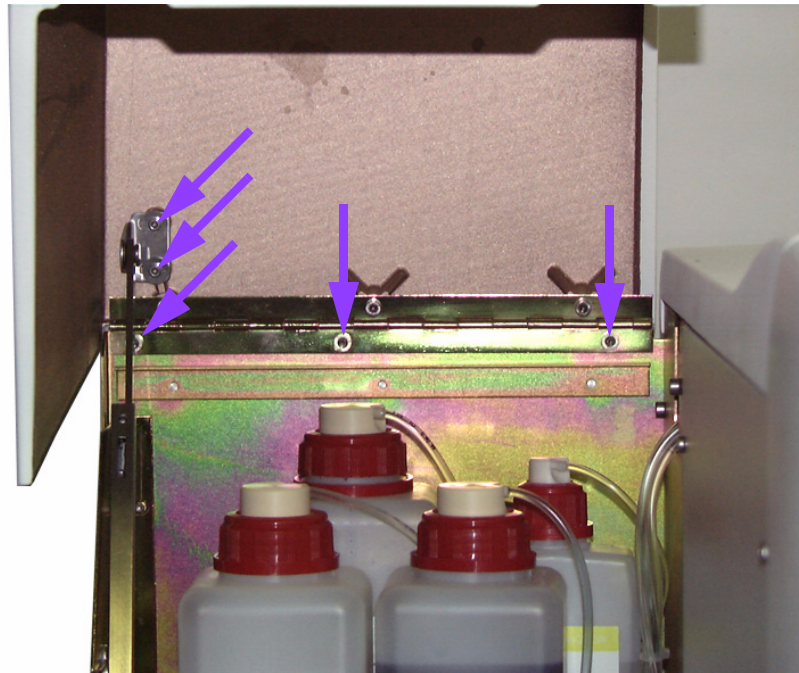


Diag.4 Right side cover

Open **Reagent cover** ( lift up, then pull it slowly down).

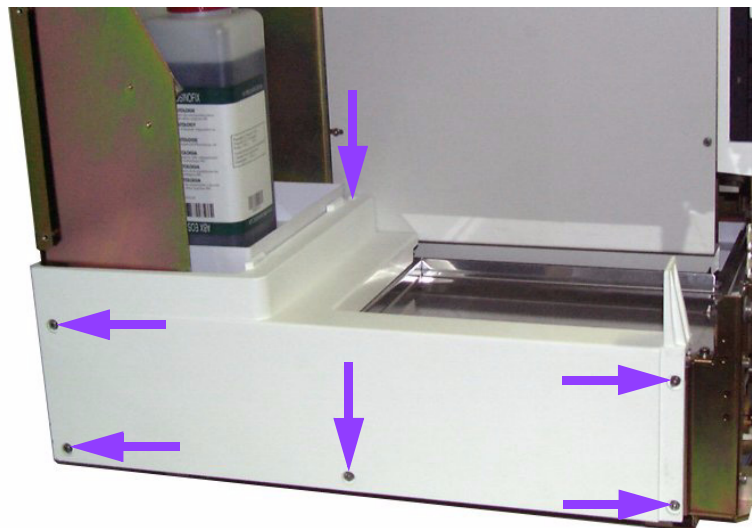


Remove it with **Reagent cover hinge** by unscrewing 3 CHC M4X8 and 2 CHC M3X6 with washers (See Diag.5 “**Reagent cover**”, page 4).



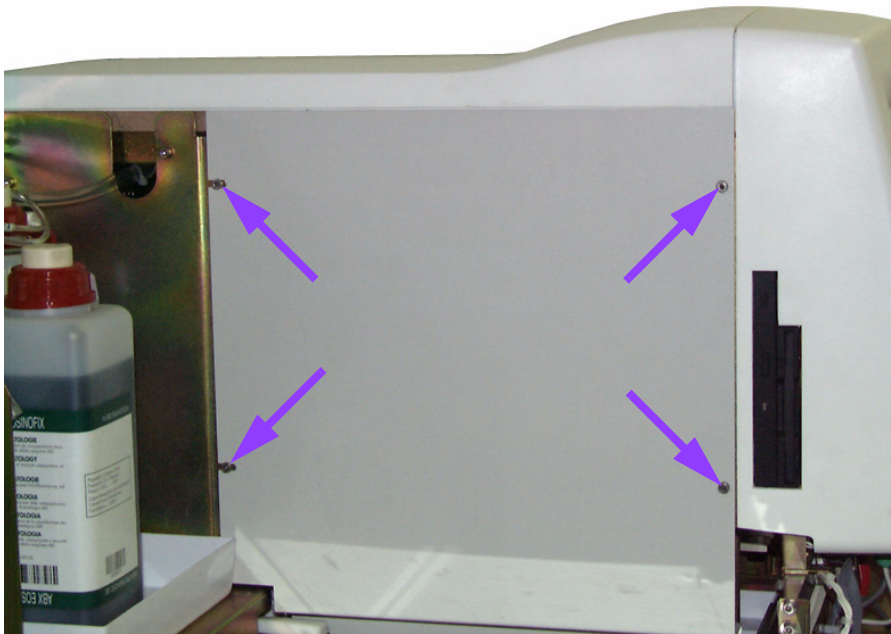
*Diag.5 Reagent cover*

Remove **Left side cover** by unscrewing 6 CHC M4X6 (See Diag.6 “**Left side cover**”, page 4).



*Diag.6 Left side cover*

Remove **Left Panel** by unscrewing 2 CHC M4X6 at the front and loosening 2 CHC M4X6 at the rear (See Diag.7 “**Left panel**”, page 5).

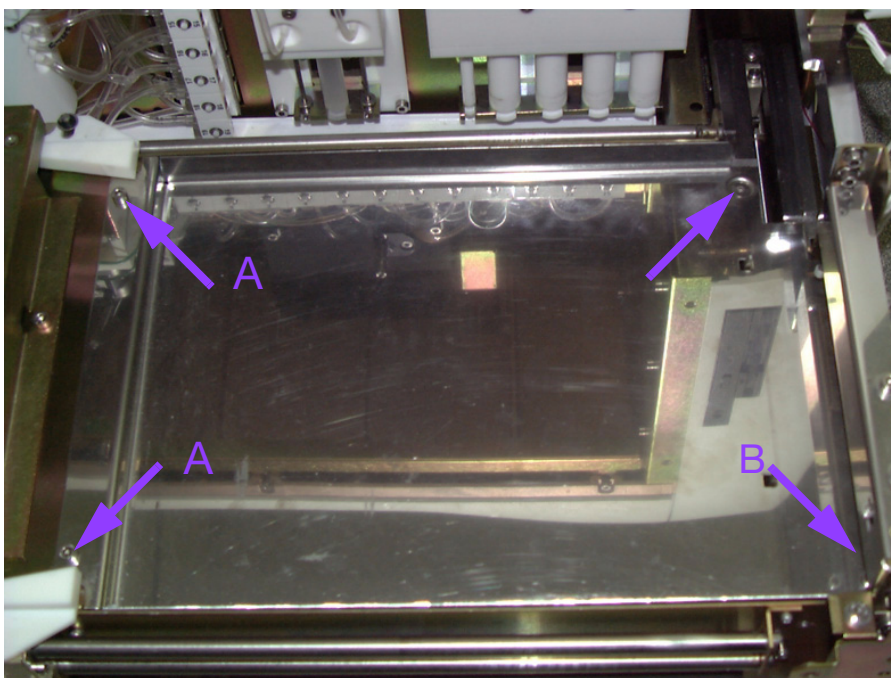


Diag.7 Left panel

Remove **Loading tray** by unscrewing the 2 CHC M4X6 (A) and 1 FHC M4X6 and loosening 1 CHC M4X6 (B). (See Diag.8 “**Loading tray**”, page 5).

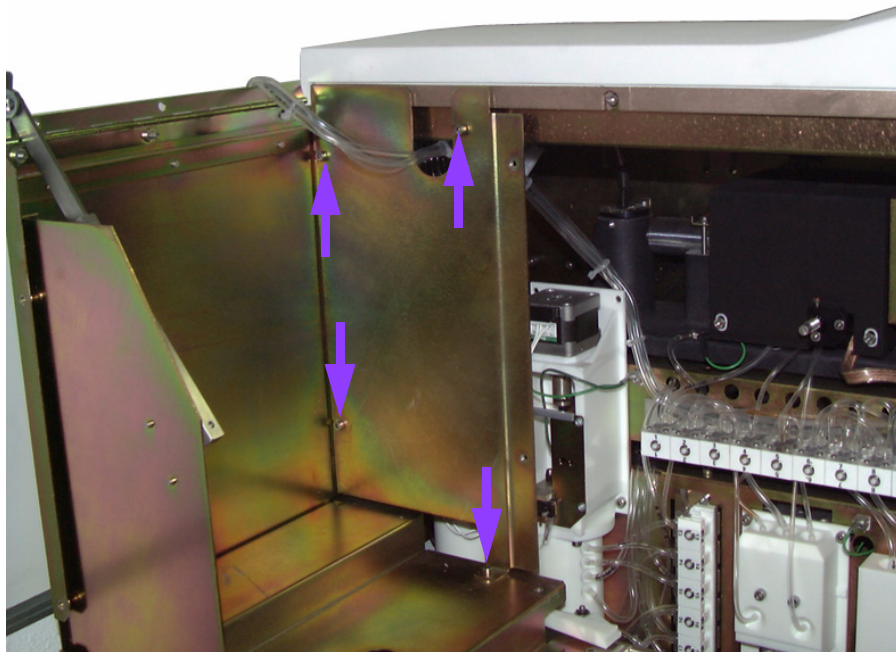


To remove loading tray, open the 2 **Slides**, then lift the tray from the rear to the front. Take care not to damage the switches.



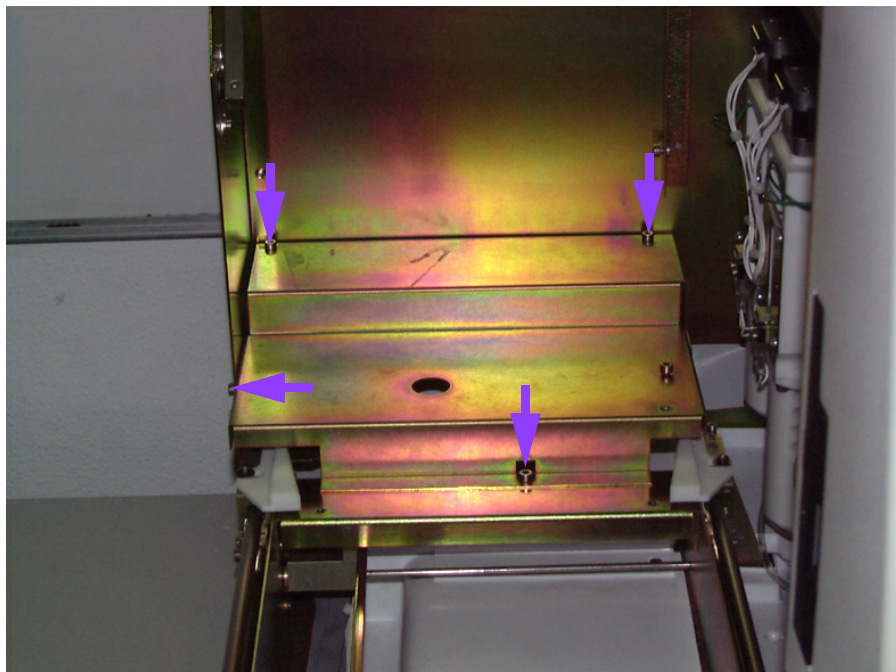
Diag.8 Loading tray

Remove the 4 reagent bottles (disconnect tubes from the stoppers).  
Remove **bottle recuperation tray**.  
Remove the **Rear panel** by loosening 4 CHC M4X6 (See Diag.9 "**Rear panel**", page 6).



Diag.9 Rear panel

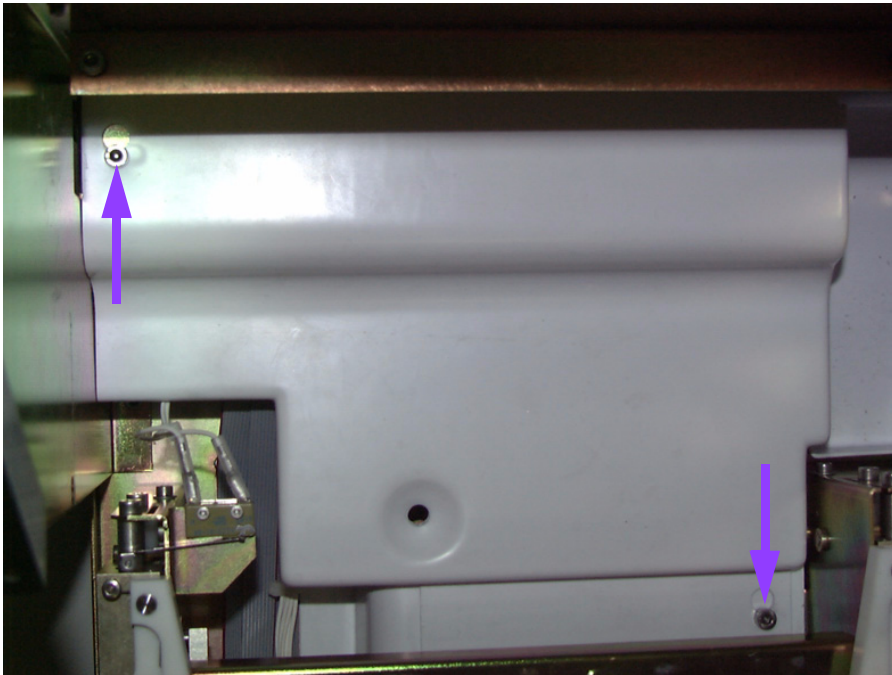
Remove **Bottle support** by loosening 4 CHC M4X6 (See Diag.10 "**Bottle support**", page 6).



Diag.10 Bottle support

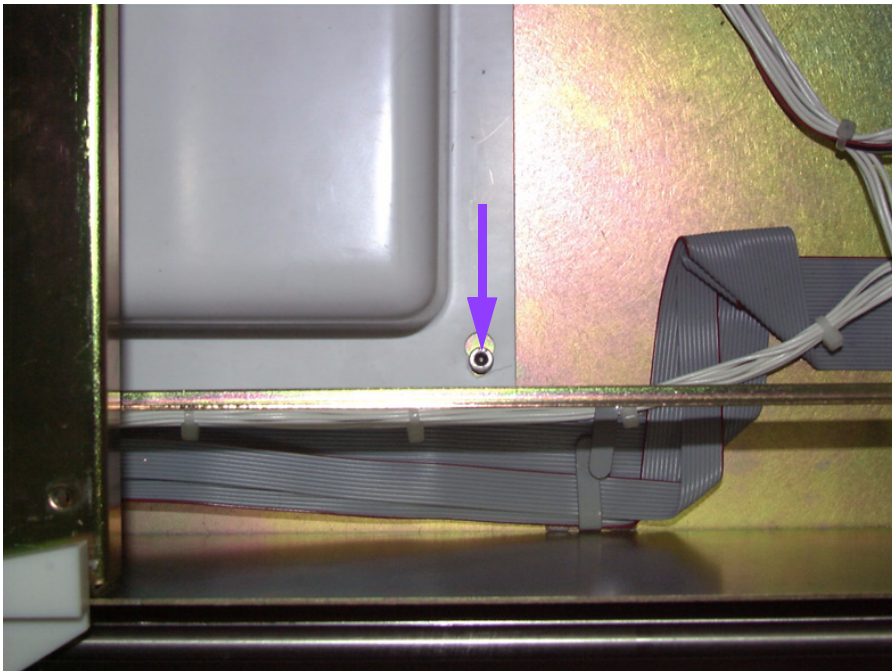


Remove the **Motor board protection 1** by loosening the 2 CHC M4X6 screws (See Diag.11 “**Motor board protection 1**”, page 7).



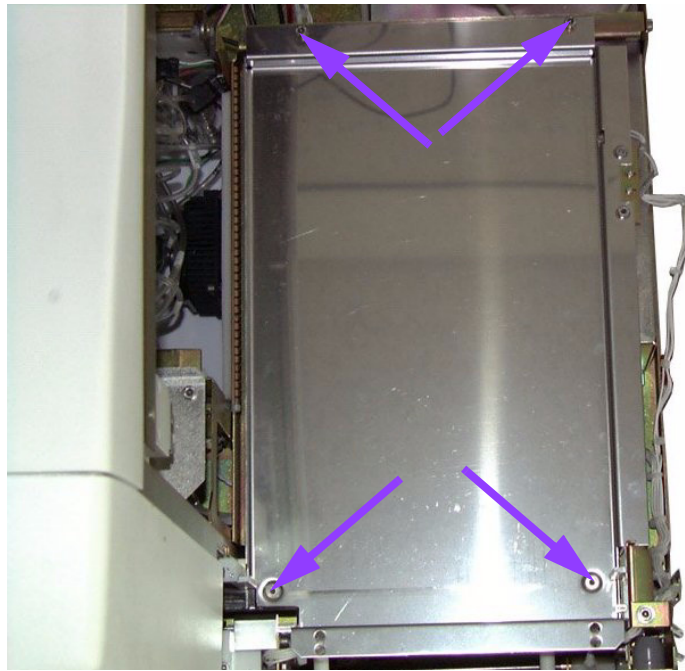
Diag.11 Motor board protection 1

Remove the **Motor board protection 2** by loosening the CHC M4X6 screws (See Diag.12 “**Motor board protection 2**”, page 7).



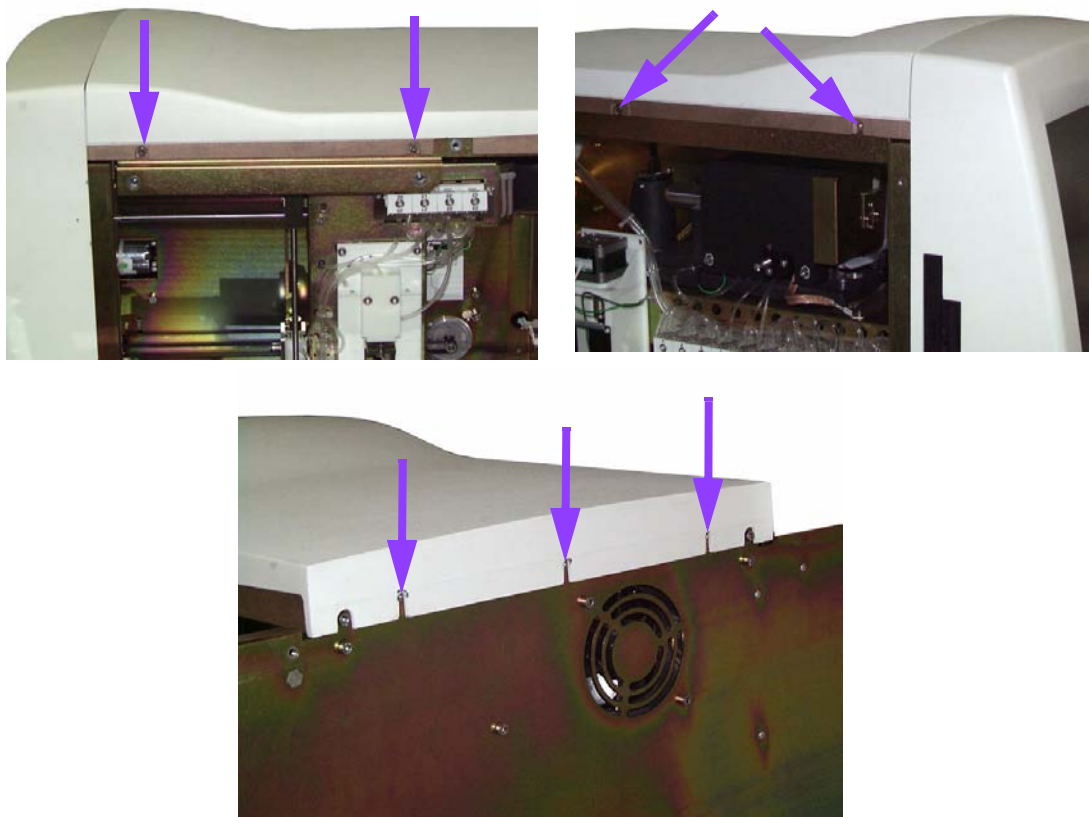
Diag.12 Motor board protection 2

Remove **Ejection Tray** by unscrewing 2 CHC M4X6 and 2 FHC M4X6 (See Diag.13 “Ejection tray”, page 8).



Diag.13 Ejection tray

Remove **Upper Cover** by unscrewing 6 CHC M4X6 screws : 2 on the right side, 2 on the left side and 3 at the rear of the instrument (See Diag.14 “Upper cover”, page 8).



Diag.14 Upper cover

## Internal barcode adjustment Procedure

RAS343B



- Concerns

- Adjustment of the internal barcode reader.
- Barcode configuration

- Required tools

- Allen keys
- Flat screwdriver

- Required products

None

- Intervention time

15 min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Barcode reader adjustment check

Remove cover (see RAS342 procedure).

Load a rack with 2 tubes fitted with the same large barcode sticker in position 1 and 2, to check the correct barcode reading operation.

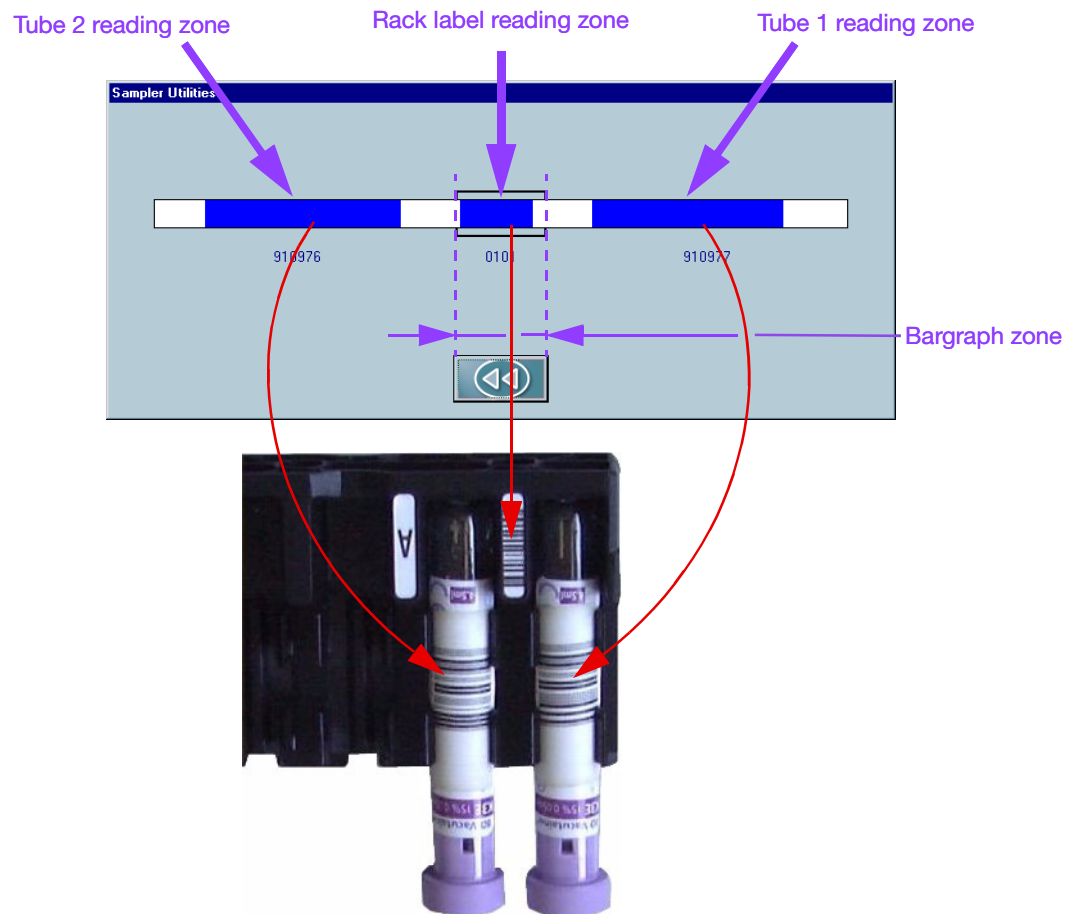
Enter: **Menu\Service\Technician Menu\Gains\Sampler Adjustment.**

Put the rack on Loading Tray.

Press **Barcode Reader Adjustment** button.

Rack is moving in front of Barcode Reader and cycle starts.

At the end of cycle, Rack label reading zone must be within bargraph zone (See Diag.1 "Barcode screen", page 2).



Diag.1 Barcode screen



Tube reading zone depends on label width and label condition. If there is reflections, reading zone may be in several parts.

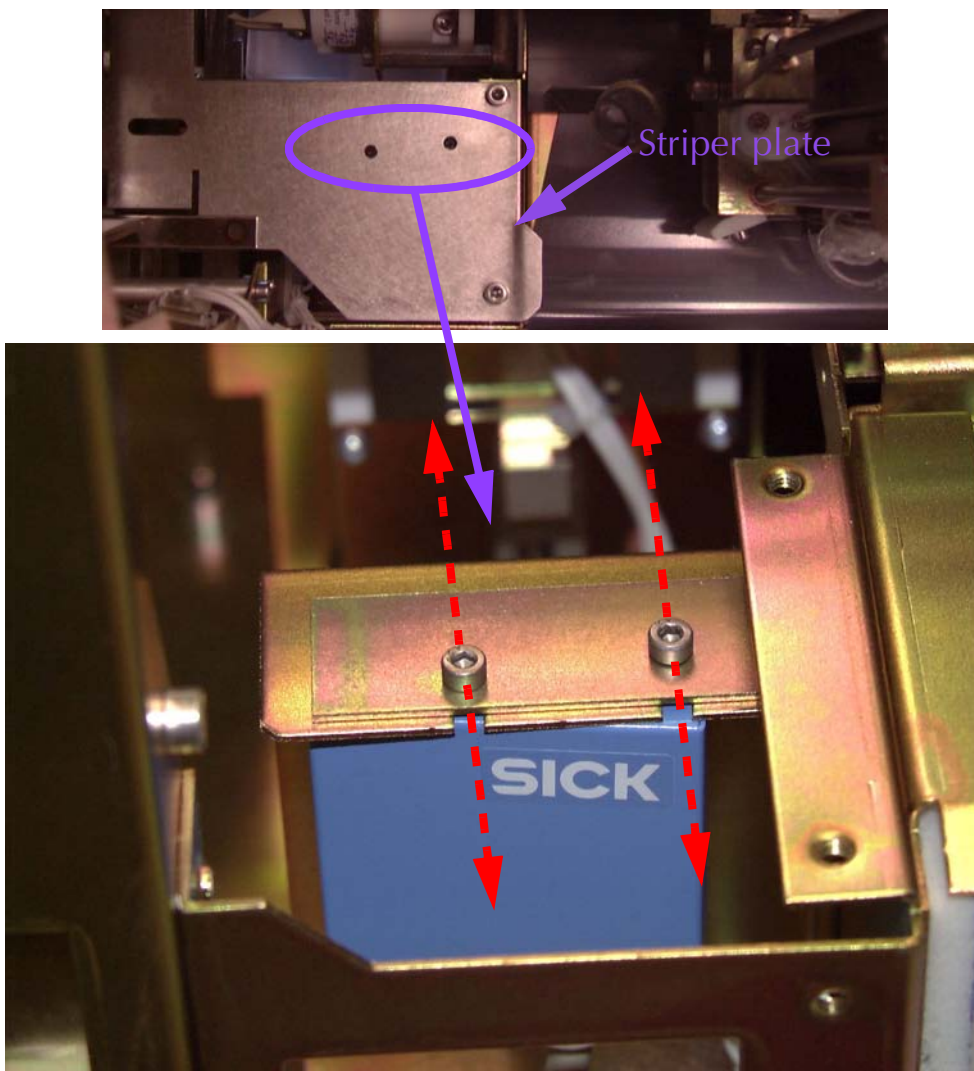
## 2. Barcode reader adjustment

If Rack label reading zone is not within bargraph zone, free the Barcode Reader Support Plate by loosening the two M3x6 CHC screws (See Diag.2“Barcode reader”, page 3), then move it to adjust reading position.



To reach the screws, there are two holes in Stripper Plate (See Diag.2“Barcode reader”, page 3). The angle between the Barcode Reader and the label to read must be always the same. Barcode Reader Support Plate purpose is only to move to the Left or to the Right.

When you are in front of the system:  
If Rack Label Reading Zone is on the right , **pull** barcode reader on the EjectionTray side.  
If Rack Label Reading Zone is on the left , **push** barcode reader on the LoadingTray side.  
Press **Barcode Reader Adjustment** button and check Rack Label Reading Zone position.  
Repeat this procedure until you get the correct adjustment.



Diag.2 Barcode reader



### 3. Barcode configuration

#### 3.1. Typology and Ccheck Digit

Several standards of barcode labels with different encoding are available. According to the model of barcode used by the laboratory, it is necessary to define the settings of the read characters.

Following, the barcode standards the most used in laboratories:

- Code 2 of 5 interleaved
- Code 39
- Code 128
- Codabar

Among those typologies, some can be used with or without Check Digit. The Check Digit is an added encoding digit, located on the right part of the code, and corresponds to an algorithm returned value that checks the integrity of the barcode reading.

The Check Digit is optional and is defined by the administrator of the barcode label edition software.

#### 3.2. Barcode configuration

Previously to barcode configuration, it is necessary to know the barcode models used in the laboratory and to note the Typology and the Check Digit exploitation.

*Exemple:*

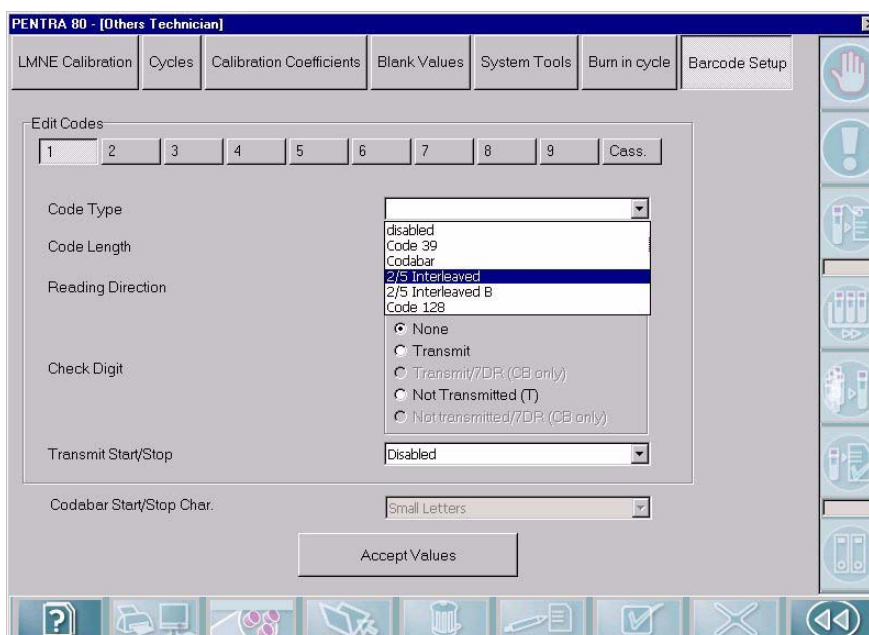
- 1- Note the label models used in the laboratory as shown:

Laboratory XXX	
Typology	Check digit
Code 2 of 5 interleaved	No
Code 128	Yes
Codabar	Yes

- 2- Log in as «Technician» while starting the Pentra 80 application.

- 3- Open the «Technician/Others» screen (See Diag.3“Barcode configuration screen”, page 4) and perform the setting adjustment as follows:

- Open the tab 1.
- Select the «Code type = 2/5 Interleaved».
- Check the «Check Digit None» box.
- Confirm pressing «Accept values».



Diag.3Barcode configuration screen

- open the tab 2.
- Select the «Code type = Code 128».
- Check the «Check Digit = Not transmitted» box.
- Confirm pressing «Accept values».
- And then open the tab 3.
- Select the «Code type = Codabar».
- Check the «Check Digit = Not transmitted» box.
- Confirm pressing «Accept values».

### 3.3. Settings parameters meaning

- **Code Type:** This parameter is set according to the barcode typology used in the laboratory. If several barcode labels are used, each one must be defined in one of the tab provided in the screen.
- **Code length:** the recommended value is «01-16».
- **Reading direction:** can not be configured, it means that the label is readable whatever its position on the tube (right way or reverse way).
- **Check Digit:** This parameter is set according to the barcode typology used in the laboratory.
- **None:** must be checked if the barcode model is «without Check Digit».
- **Transmit:** must not be used.
- **Not transmitted:** must be checked if the barcode model is «with Check Digit».
- **Transmit Start/Stop:** must be set on «Disabled».
- **Codabar Start/Stop Char.:** disabled when the «Transmit Start/Stop» option is disabled.

### 3.4. Troubleshooting

#### 1- Labels are never read:

- Check the if the label is readable.
- Check there is white gap of at least 3/4 millimeters before the first bar and after the last one.
- Check that the typology of the label used has been defined in a tab of the «Technician/Others» screen.
- Check that the label is with «Check Digit» and that it has been defined as «Check Digit: Not transmitted».

#### 2- Labels are read, but an added digit appears on the right side:

Label includes «Check Digit», but the option has been defined on «None».





## External barcode configuration Procedure

RAS344B



- Concerns

External barcode reader test and configuration.

- Required tools

None

- Required products

None

- Intervention time

15 min.

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Barcode reader configuration check

Check that barcode reader is working properly by means of reading test.

### INTERLEAVED 2 OF 5 (no «check digit» control)

with C.D.



1224488  
reading 12244881

without C.D.



121314151617  
reading 121314151617

### CODE 39 (no «check digit» control)

with C.D.



reading 12345ABCDE

without C.D.



reading 12345ABCDEW

### CODE 128 (control without «check digit» transmission)



123456abcde



QWERTY



12345ABCDE



azerty

### CODABAR (no equality control between start/stop character)



37859  
reading 37859



123456/\$  
reading 123456/\$

*Diag.1 Barcode reading test*

## 2. Barcode reader setup

An audible beep occurs after each reading. Read all the labels from top to bottom and from left to right.

When the last label is read, check once more on the test labels.



For the code I2 of 5, to avoid a bad interpretation, it is mandatory to hold the reader in order to read the **entire** code.

If the reading test has failed for the DATALOGIC reader, proceed to the barcode setup as follows:



\$+\$\* Restore system default configuration



\$+ Enter configuration environment



CP507 WEDGE for IBM AT - ALT mode



AZ0 Disable all family code



AB11AB\*0116 Code 39, no C.D., 1 to 16 char



AC110416 ITF, no C.D., 4 to 16 char



AD111AD\*0316 Codabar, no start/stop, 3 to 16 char



A11 Code128, C.D. control without transmission



EA10 no Terminator



ED3 4 good reads before accepting code



\$- Exit and save configuration



## Heater assy replacement Procedure

RAS345B



- Concerns

Replacement of the reagent heating system.

- Required tools

- Hexagonal keys
- Flat screwdriver

- Required products

None

- Intervention time

1h.

- Frequency

On request

- Specific kit or consumables

XDA625AS



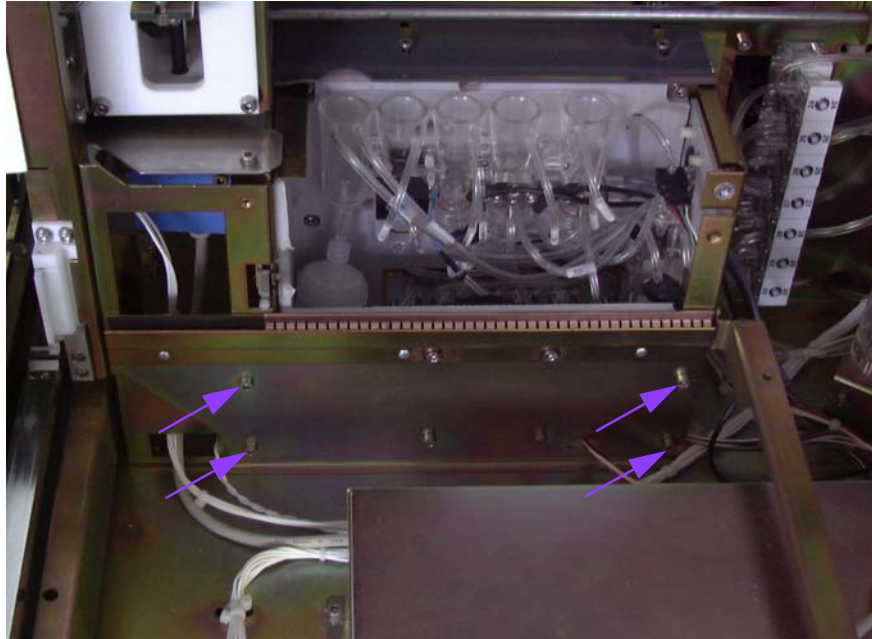
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Heater assy dismantling

Switch the instrument off and disconnect power supply cable.

Remove the cover and open the righthand side panel (See procedure RAS342 Front panel & Cover dismantling for further details).

Remove the lower part of thermostatic room (See Diag.1 "Thermostatic room dismantling", page 2).



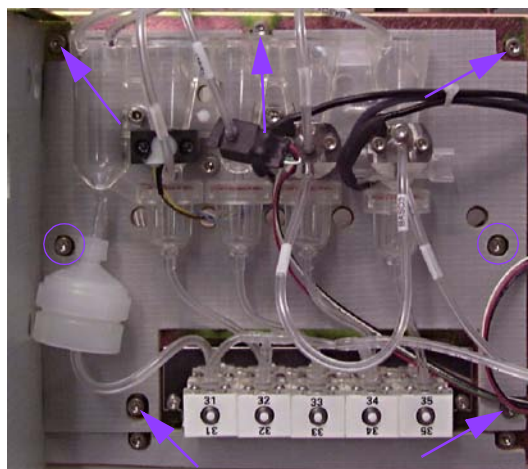
Diag.1 Thermostatic room dismantling

From the chamber assy disconnect the following tubes:

- Rinse chamber: Inlets 1&2
- Dil1\Hgb chamber: Inlet 2
- LMNE chamber: Inlet 4 (Leave the detection cell connected to the LMNE chamber)
- RBC chamber: Inlet 2
- WBC\Baso chamber: Inlets 1&4

Untight the 2 heater fixation screws (See Diag.2 "Chamber assembly dismantling", page 2).

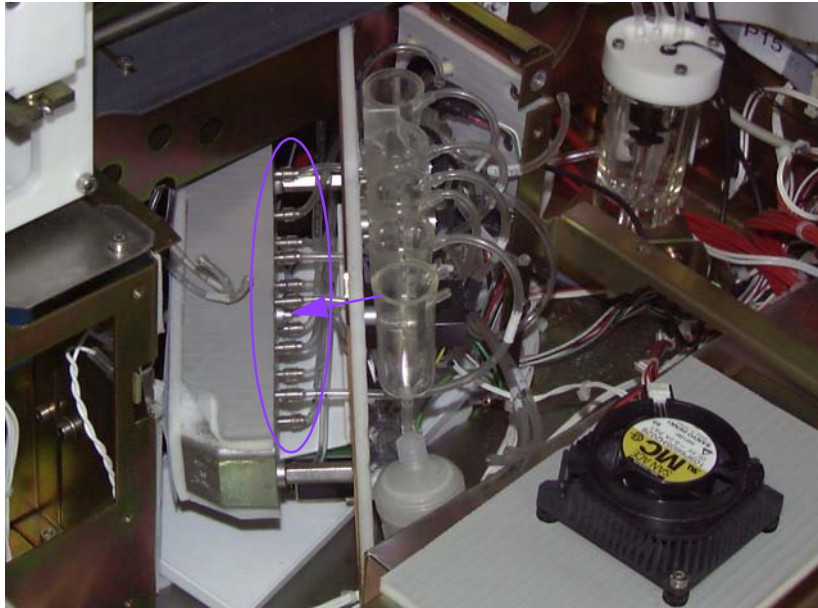
Unscrew the 5 chamber assembly fixation screws (See Diag.2 "Chamber assembly dismantling", page 2).



Diag.2 Chamber assembly dismantling

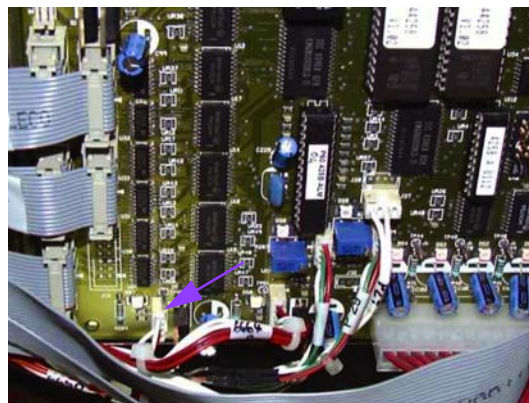
Unscrew the CTN fixation screw from the heater (See Diag.3 "Heater disconnection", page 3).

After having recorded the tube location on the heater, disconnect all the tubes (See Diag.3 "Heater disconnection", page 3).



Diag.3 Heater disconnection

Disconnect CTN from main board plug in J31 (See Diag.4 "CTN disconnection", page 3).



Diag.4 CTN disconnection

Remove the heater.

## 2. Heater replacement

Install the new heater the same way in reverse order.



Use sleeveings when necessary (Tubes connected to the heater for example).  
 Make sure all the tubes are connected.  
 Enter new CTN value and adjust Heating coil temperature after replacement.

When new heater is installed start the instrument and check for no leak.  
 Enter the **new CTN value** (Follow procedure RAS333 «Temperature adjustment» ).  
 Check and adjust the MDSS adjustment (Follow procedure RAS329 «Chambers adjustment» ).  
 Complete a rinse cycle then prime all reagents.  
 Perform the «Chekup after intervention» procedure RAS340 in order to be sure the instrument works properly.







- Concerns

Replacement of the mixer system.

- Required tools

- Hexagonal keys
- Flat screwdriver

- Required products

None

- Intervention time

1h.

- Frequency

On request

- Specific kit or consumables

- PC extension cable: XEA723AS
- Mixer assembly: XDA743A



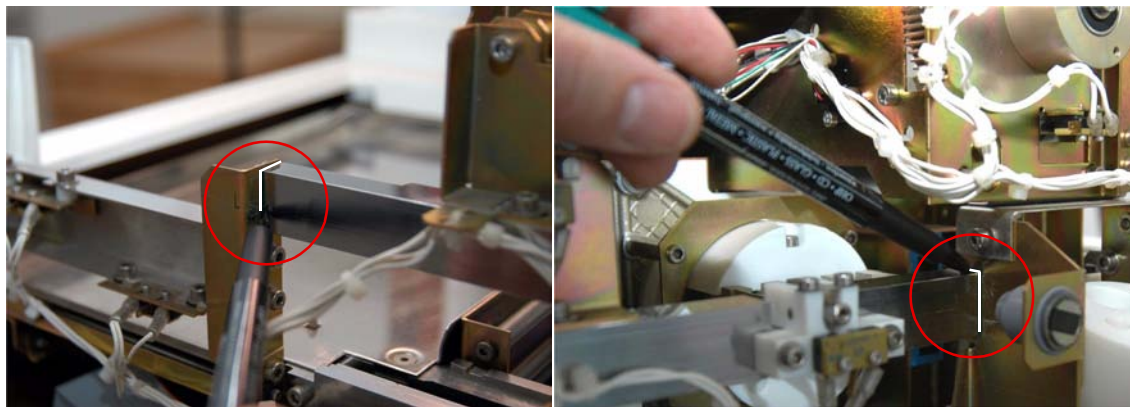
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Mixer assembly dismantling

Turn off the instrument.  
Remove the power supply cable.  
Remove Covers (see RAS342B).  
Remove the internal PC (see RAS348B) and install the XEA723AS extension cable kit.

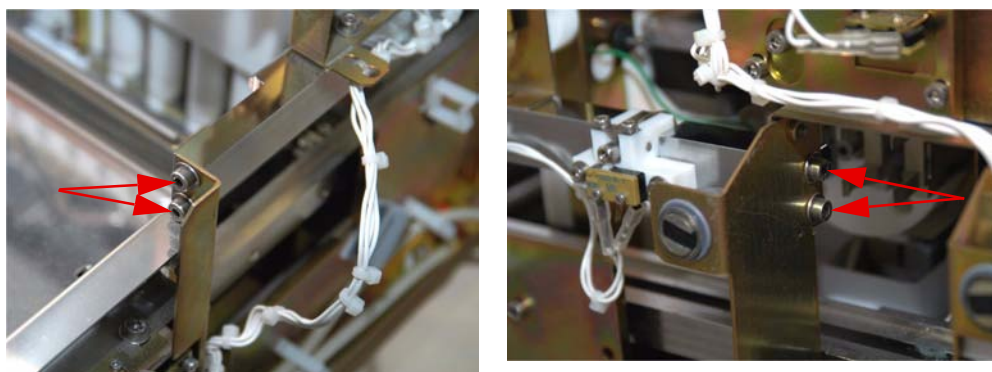
### 1.1. Top sampler transfer rail dismantling

Before dismantling, mark with a pen the location of the rail on its support (See Diag.1“[Rail location](#)”, page 2).



Diag.1 Rail location

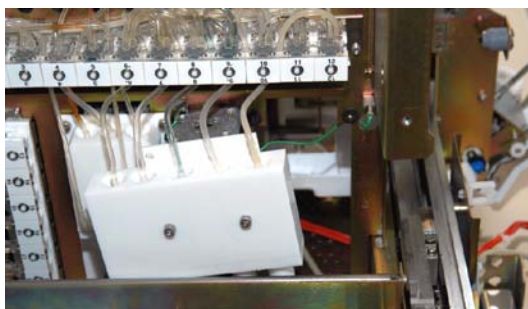
Unscrew the 4 CHC screws then remove the rail (See Diag.2“[Rail screws](#)”, page 2).



Diag.2 Rail screws

### 1.2. Reagent syringe dismantling

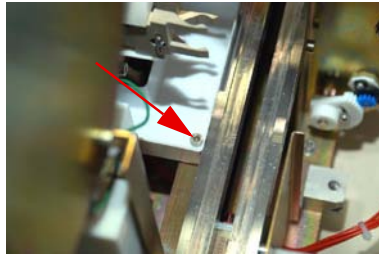
Loosen the 4 CHC screws (just few turns) to free the silent blocks.  
Push the block to the left with the tubes connected (See Diag.3“[Reagent syringe block](#)”, page 2).



Diag.3 Reagent syringe block

### 1.3. Plastic protection

Remove the plastic protection located under the mixer by unscrewing the CHC screw (See Diag.4“[Plastic protection](#)”, page 3).



Diag.4 Plastic protection

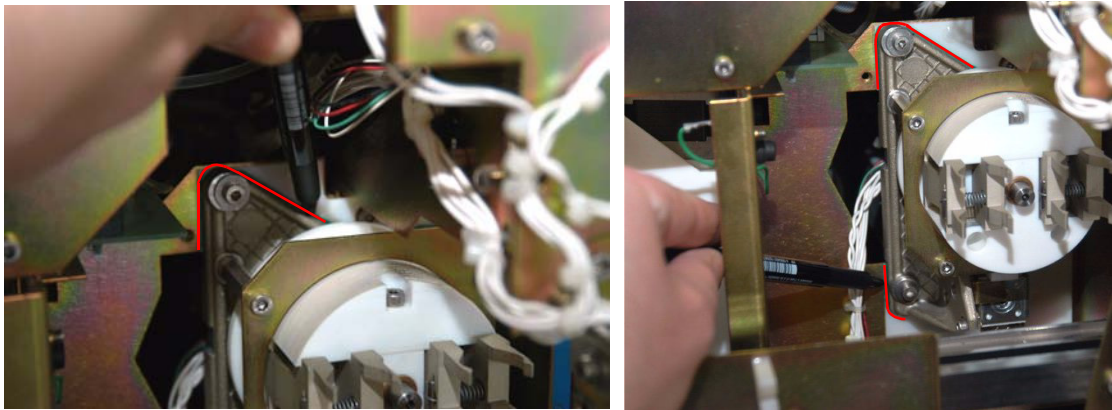
### 1.4. Mixer disconnection

Follow RAS332B (Motor board adjustment procedure) to access to the motor board.  
On the motor board, disconnect the following connectors:

- J19 (  $\mu$ step motor)
- J22 (Tube mixer motor home)
- J23 (grabber status)
- J21 (head locking solenoid)

### 1.5. Mixer assembly replacement

If the Pentra 80 serial number is lower than P800154, locate the Mixer assembly location: mark the contour of the mixer with a pen (See Diag.5“[Mixer location](#)”, page 3).



Diag.5 Mixer location

If the Pentra 80 serial number is higher than P800154, 2 squares are fixed on the support plate to keep the location.



Never unscrew the squares, they are factory adjust and that is the only way to keep the mixer assembly position.

Unscrew the 3 CHC screws then carefully remove the Mixer assembly.



Do not remove the wedge.  
The thickness of this wedge is factory calculated and associated with this instrument to keep the correct distance between the mixer and the rack rails, apart from the mixer assembly.

Note down the parameters writted on the new mixer.  
Install the new mixer assembly by following the previous steps backward.

## 2. Adjustments



- If the Pentra 80 serial number is higher than P800154, no adjustments are necessary, except entering the new movement values as follow.

- Plug the power supply cable then turn on the instrument.
- Enter : **Menu \ Service \ Technician Menu \ Gains \ Sampler adjustment** (See Diag.6“**Technical adjustment screen**”, page 4).
- In the «Mixer Mechanism Adjustment» window, enter the movement values (Move Forward 1, Open/Close Grabbers / Move Back Home / Move Forward 2) noticed on the new mixer and previously noted down.



Mixer adjustments are factory made and parameters are written on a label on the mixer body.

**PENTRA 80 - [Technical Adjustment]**

Thermic Adjustment | M.D.S.S. Adjustment | Liquid Sensor Adjustment | Vacuum Control | **Sampler adjust.** | Bubbling

**Loading Mechanism Adjustment**

Stop Rack Loading: 13  
Check Stop Rack

Max Rack Loading: 3330  
Check Max Loading

**Barcode Reader**

Barcode Reader Adjustment

**Mixer Mechanism Adjustment**

Mixer Home: 110  
Check Mixer Home

Move Forward 1: 1493

Open/Close Grabbers: 554

Move Back Home: 611

Move Forward 2: 960

Check Mixer

Check Magnet

**Transfer Mechanism Adjustment**

Transfer Home: 36  
Check Transfer Home

Stop Transfer: 5  
Check Stop Transfer

Rack Ejection: 1200  
Check Rack Ejection

First Transfer: 960  
Check Rack Transfer Movement

Version V1.3.0 | 03/16/2004 13:23:12

Diag.6 Technical adjustment screen

- Press the «Check Mixer» button:  
The mixer run the movements one by one.
- Check each movement and press «Enter» after each to launch the next one.



- If the serial number is lower than P800154, check the following grabber positions procedure.

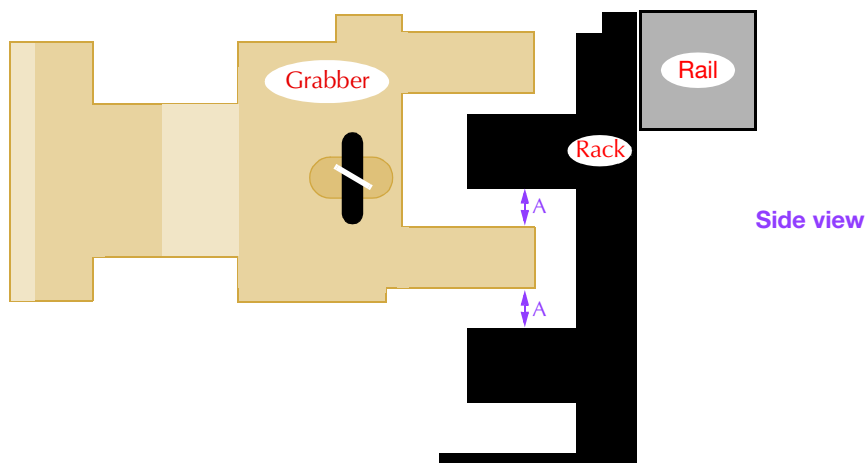
- Check the Transfer mechanism home (see RAS347B - 3.1. Transfer home).
- Check the «First transfer» movement (see RAS347B - 3.4. First transfer).
- Control the mixer vertical position as follow:

Enter : **Menu \ Service \ Technician Menu \ Gains \ Sampler adjustment**

Press the «Check mixer» button, the grabber move forward with the grabbers open.

Check the **vertical** position of the grabbers regard to the rack (See Diag.7“**Vertical position**”, page 5):

The lowest finger of the grabber must be centered between the fingers of the rack. If it isn't the case, loosen the 3 CHC mixer fixation screws then adjust this position.



Diag.7 Vertical position

- Control the horizontal position:

To check the correct position of the grabber, place 2 tubes into the rack, position 7 and 9.

Move the rack to have the left tracer in the notch number 10 of the rack.

Enter : **Menu \ Service \ Technician Menu \ Gains \ Sampler adjustment**

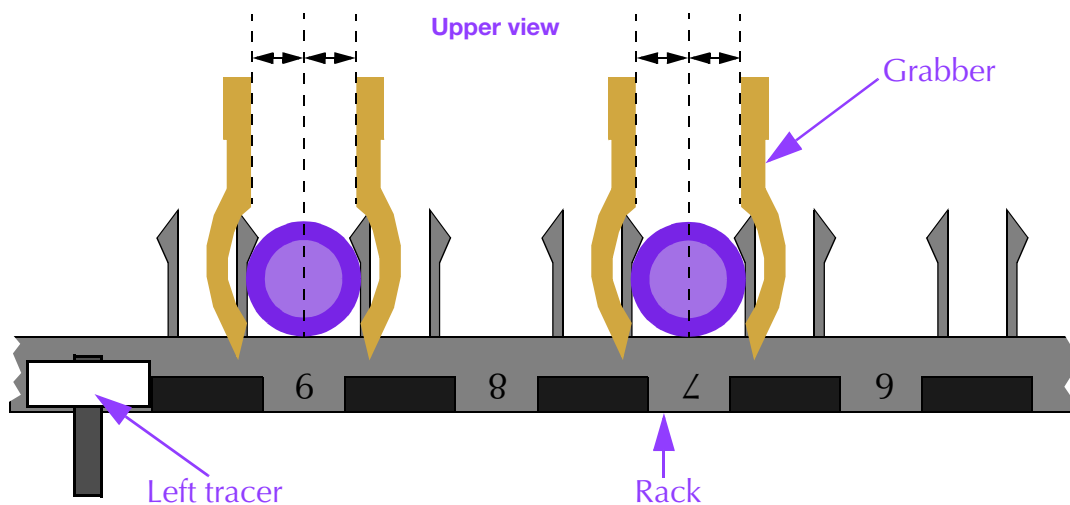
Press the «Check mixer» button, the grabber move forward with the grabbers open.

Check the **horizontal** position of the grabbers regard to the tubes (See Diag.8“**horizontal position**”, page 5):

The tubes have to be centered in the grabbers.

If it isn't the case, loosen the 3 CHC mixer fixation screws then adjust this position.

Take care not to move the vertical position previously adjusted.



Diag.8 horizontal position





- Concerns

- Loading mechanism check & adjustment
- Mixer mechanism check & adjustment
- Transfer mechanism check & adjustment

- Required tools

None

- Required products

None

- Intervention time

1 h

- Frequency

On request

- Specific kit or consumables

None

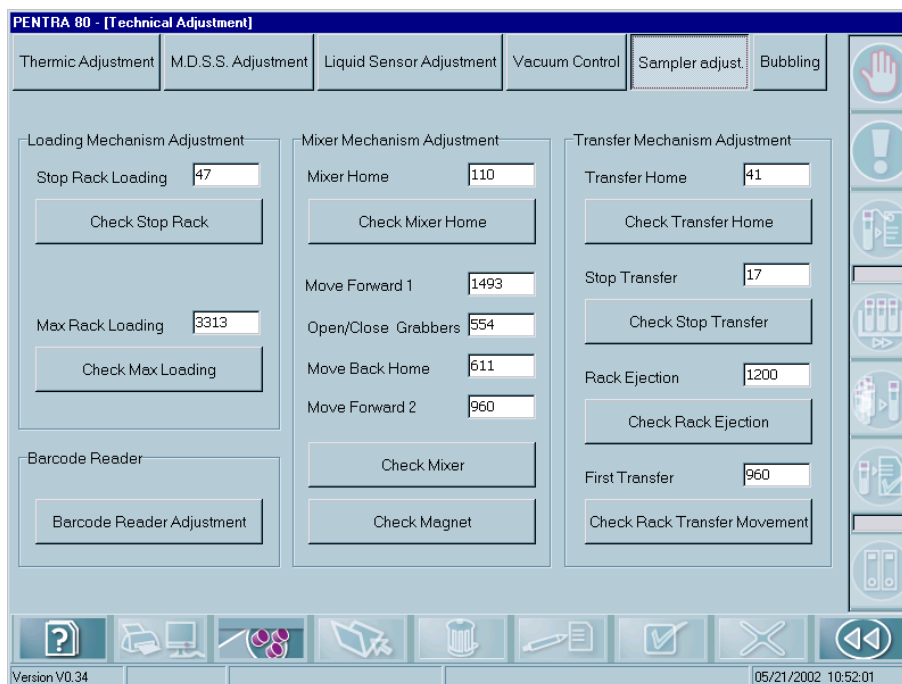


Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Loading mechanism check & adjustment

Remove cover except Loading Tray and Ejection Tray (See RAS342 procedure).

Enter: **Menu\Service\Technician Menu\Gains\Sampler Adjustment** (See Diag.1 “Sampler adjustment menu”, page 2)



Diag.1 Sampler adjustment menu



Following adjustments must be checked and adjusted in the following order.  
Make sure to not damage the different switches by moving manually the racks.

### 1.1. Max Rack Loading



«Max Rack Loading» value represents the **maximum** number of steps run by the Slides to load a rack. This motion must be superior to the necessary motion to load a rack, but without coming to mechanical stop (noise) if there is no rack (to ensure the correct position of the rack against the Front Plate).

This motion is never completed when there is a rack because it is stopped by the two switches.

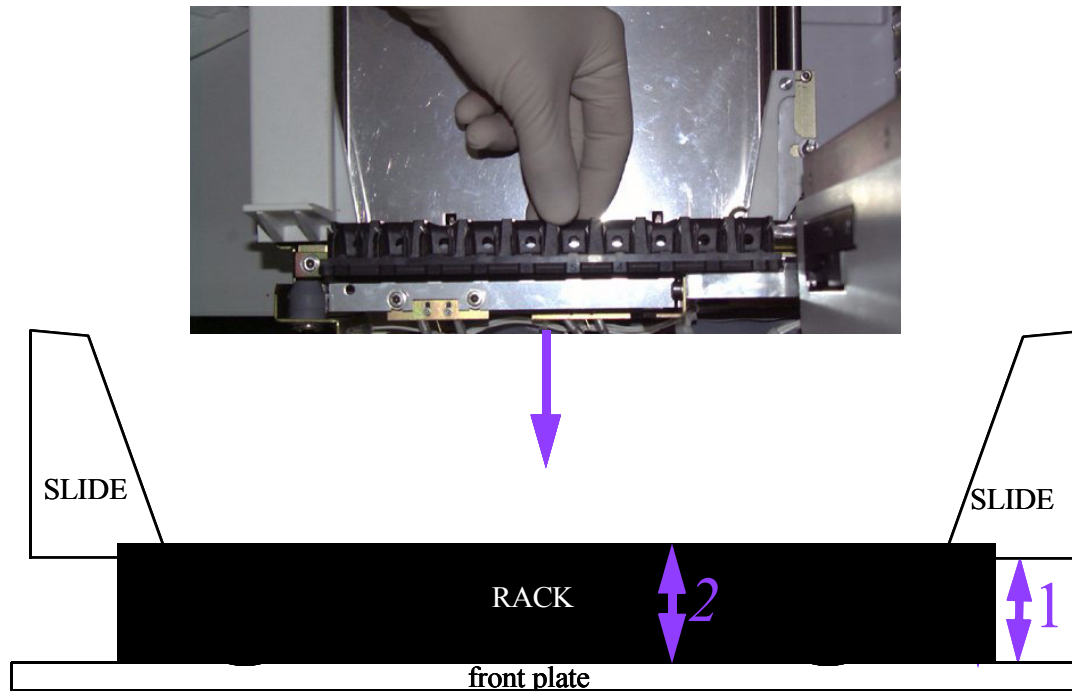
Make sure there is no rack on the Loading Tray.

Press **Max Rack Loading** button (See Diag.1 “Sampler adjustment menu”, page 2).

When motion is ended, put a rack **on** the two Slides **against** the Front Plate.

The gap between the Slides and the Front Plate (1) must be smaller than the rack thickness (2). (See Diag.2 “Max rack loading gap”, page 3).





Diag.2 Max rack loading gap

Check the gap, then press validate button.

If the gap (1) is too small (mechanical stop, noise), decrease «Max Rack Loading» value.

If the gap (1) is too big, increase «Max Rack Loading» value.

Repeat the procedure until you get the correct adjustment.

## 1.2. Stop Rack Loading

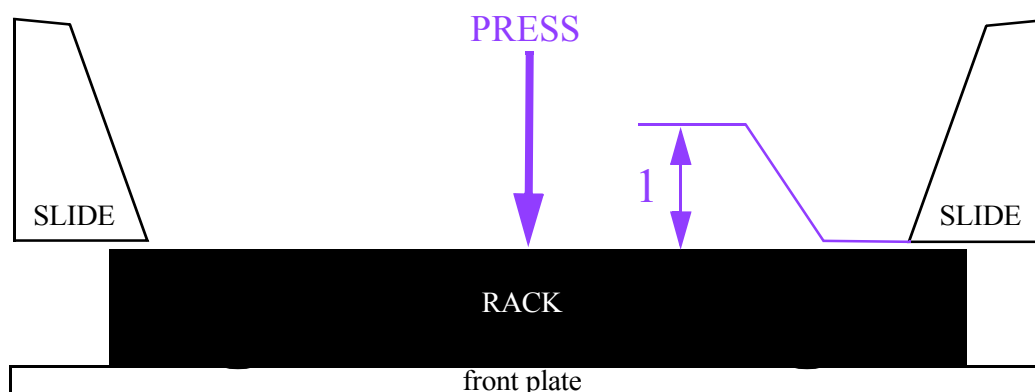


«Stop Rack Loading» value represent the number of steps after switches detection, to ensure correct rack position.

Put a rack on Loading Tray, then press **Check Stop Rack** button (See Diag.1 “[Sampler adjustment menu](#)”, page 2).

When motion is ended, make sure there is a bit of play between Slides,rack and Front Plate:

Press rack on the Front Plate, then check play (1) between rack and Slides.It must be around 0.5 mm (See Diag.3 “[Rack and Front Plate play](#)”, page 3).



Diag.3 Rack and Front Plate play



Make sure that motor does not loose steps (noise) when Slides come against the rack, because it can return a little bit if motion is too big.

If play (1) is too big : increase «Stop Rack Loading» value.  
If play (1) is too small : decrease «Stop Rack Loading» value.  
Repeat the procedure until you get the correct adjustment.

## 2. Mixer mechanism check & adjustment

Mixer adjustments are factory made and parameters are writing on a label on mixer body.  
They must not be modify, but if necessary, follow «Mixer replacement» procedure (RAS346).

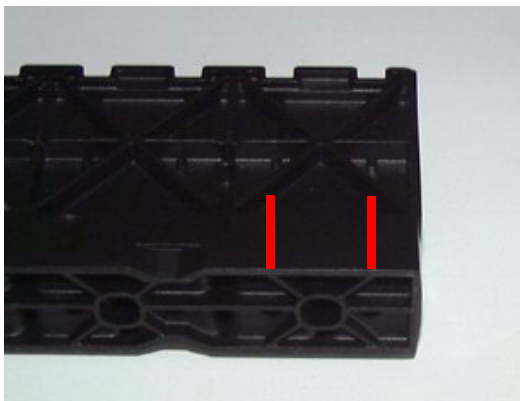
## 3. Transfer mechanism check & adjustment



«Transfer home» value represents the offset of Transfer Carriage. Follow the procedure in this order, because First Transfer and Rack Ejection are depending on Transfer Home.

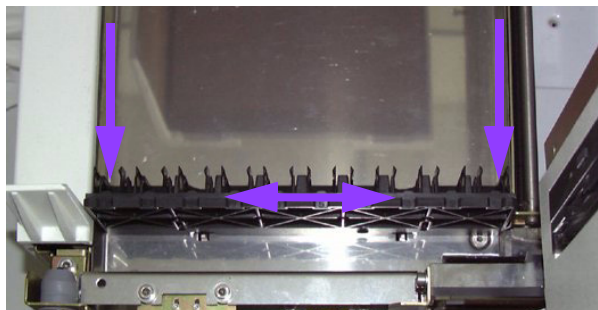
### 3.1. Transfer Home

On a rack side, mark off the hole center position with a pencil (See Diag.4 “Rack Mark”, page 4).



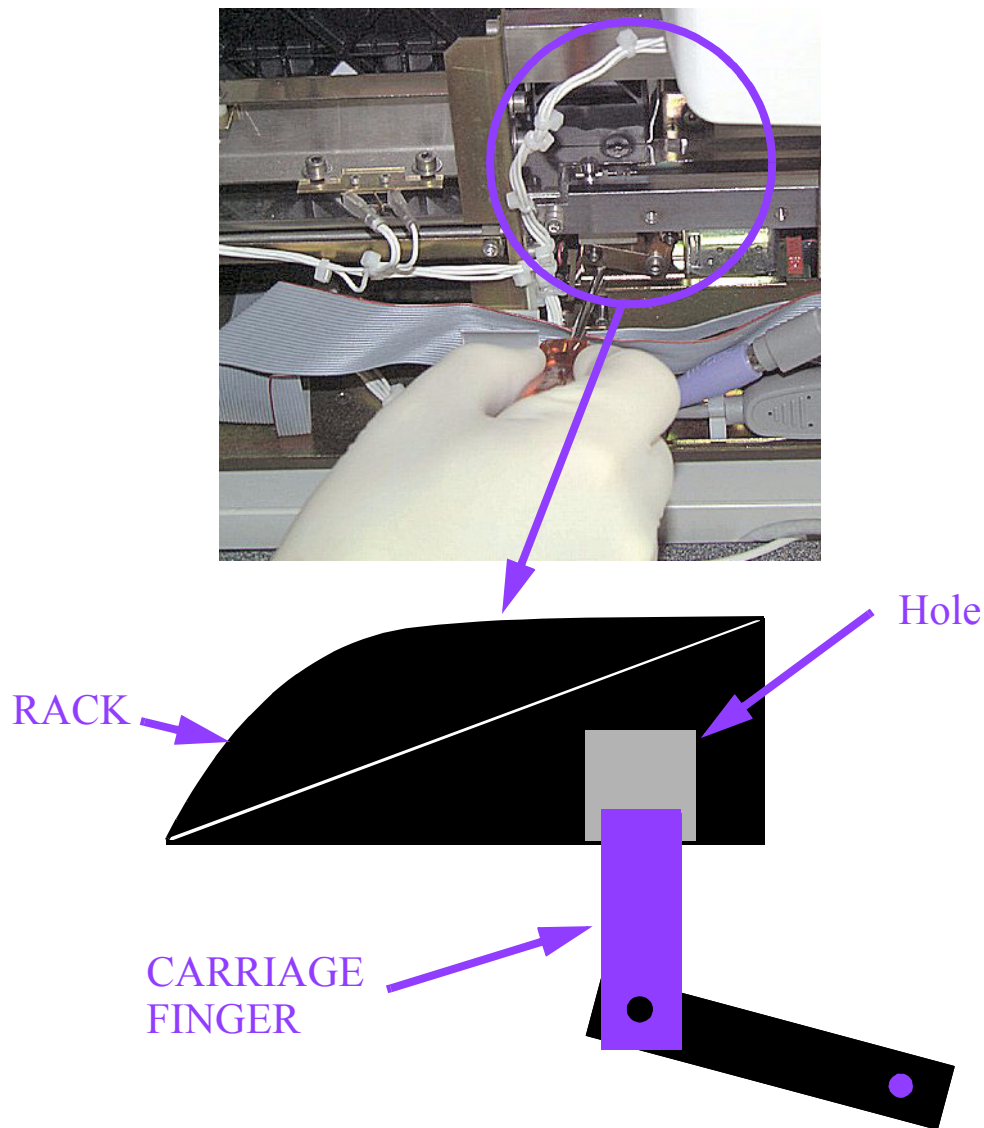
Diag.4 Rack Mark

Put the rack on Loading Tray, and adjust it on the center, to have the same left and right gap (See Diag.5 “Rack position”, page 4).



Diag.5 Rack position

Press **Check Transfer Home** button (See Diag.1 “[Sampler adjustment menu](#)”, page 2).  
When carriage is coming under rack, gently push finger up to check position (use screwdriver or pencil). Carriage Finger must be adjusted in hole center (See Diag.6 “[Carriage position](#)”, page 5).



Diag.6 Carriage position



At the end of Transfer Carriage motion, Carriage motor is no more supplied. Make sure it does not move when you push finger up.

Adjust Transfer Home value to center Carriage Finger into rack hole:

If finger is on the right, increase «Transfer Home» value.

If finger is on the left, decrease «Transfer Home» value.

Press **Check Transfer Home** button to check position.

Repeat the procedure until you get the correct adjustment.

### 3.2. Stop Transfer

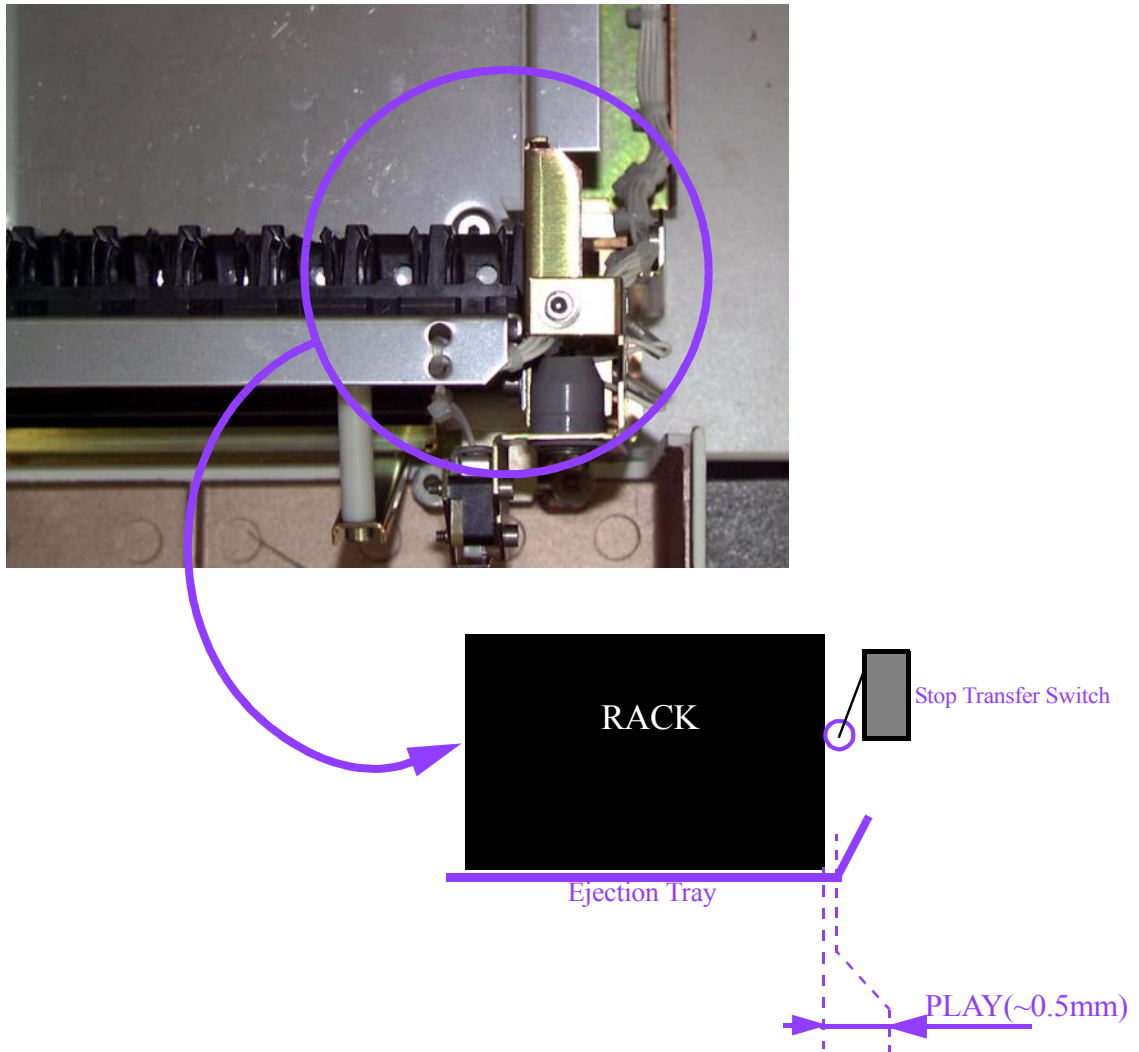


«Stop Transfer» value represent the number of steps after «Stop Transfer switch detection». After Transfer motion, you have only 4 seconds to check position before rack ejection.

Put the rack on Loading Tray.

Press **Check Stop Transfer** button (See Diag.1 «[Sampler adjustment menu](#)», page 2).

At the end of transfer motion, before ejection, make sure there is a bit of play (around 0.5 mm) between mechanical stop (Ejection Tray side) and rack (See Diag.7 «[End of transfer](#)», page 6).



Diag.7 End of transfer



Make sure that motor does not loose steps (noise) at the end of transfer motion.

If rack is too much on right, decrease «Stop Transfer» value.

If rack is too much on left, increase «Stop Transfer» value.

Repeat the procedure until you get the correct adjustment.

### 3.3. Rack Ejection



«Rack Ejection» value is the number of steps run by the Transfer Carriage to move Ejection Assembly.

Put one rack on Loading Tray and nine racks in Ejection Tray, against Ejection stops, to make sure it can push ten racks.

Press **Check Rack Ejection** button (See Diag.1 «[Sampler adjustment menu](#)», page 2).

At the end of cycle, rack must be out of «**Ejection stops**» but ejection assembly must not be at mechanical stop (See Diag.8 «[Rack ejection](#)», page 7).



### EJECTION STOPS

Diag.8 Rack ejection

If rack is not out of «**Ejection stops**» increase «Rack Ejection Value».  
 If rack is too much out of «**Ejection stops**», or at mechanical stop, decrease «Rack Ejection Value».  
 Repeat the procedure until you get the correct adjustment.

### 3.4. First Transfer



«First Transfer» value represents the number of steps of the First Carriage motion. Other motions are always the same, representing space between two tube positions on the rack. Adjust this value to center rack position under the two Tracers (followers).

Put the rack on Loading Tray.

Press **Check Rack Transfer Movement** button (See Diag.1 «**Sampler adjustment menu**», page 2).

Rack moves under Tracers (followers), then it run 25 motions on the left and 25 on the right.

The following screen shows the detection (A) and non-detection (B) zones of the Tracer switches (See Diag.9 «**Tracers detection**», page 8).

Increase or decrease «First Transfer» value to center non-detection zone (B) on bargraph.

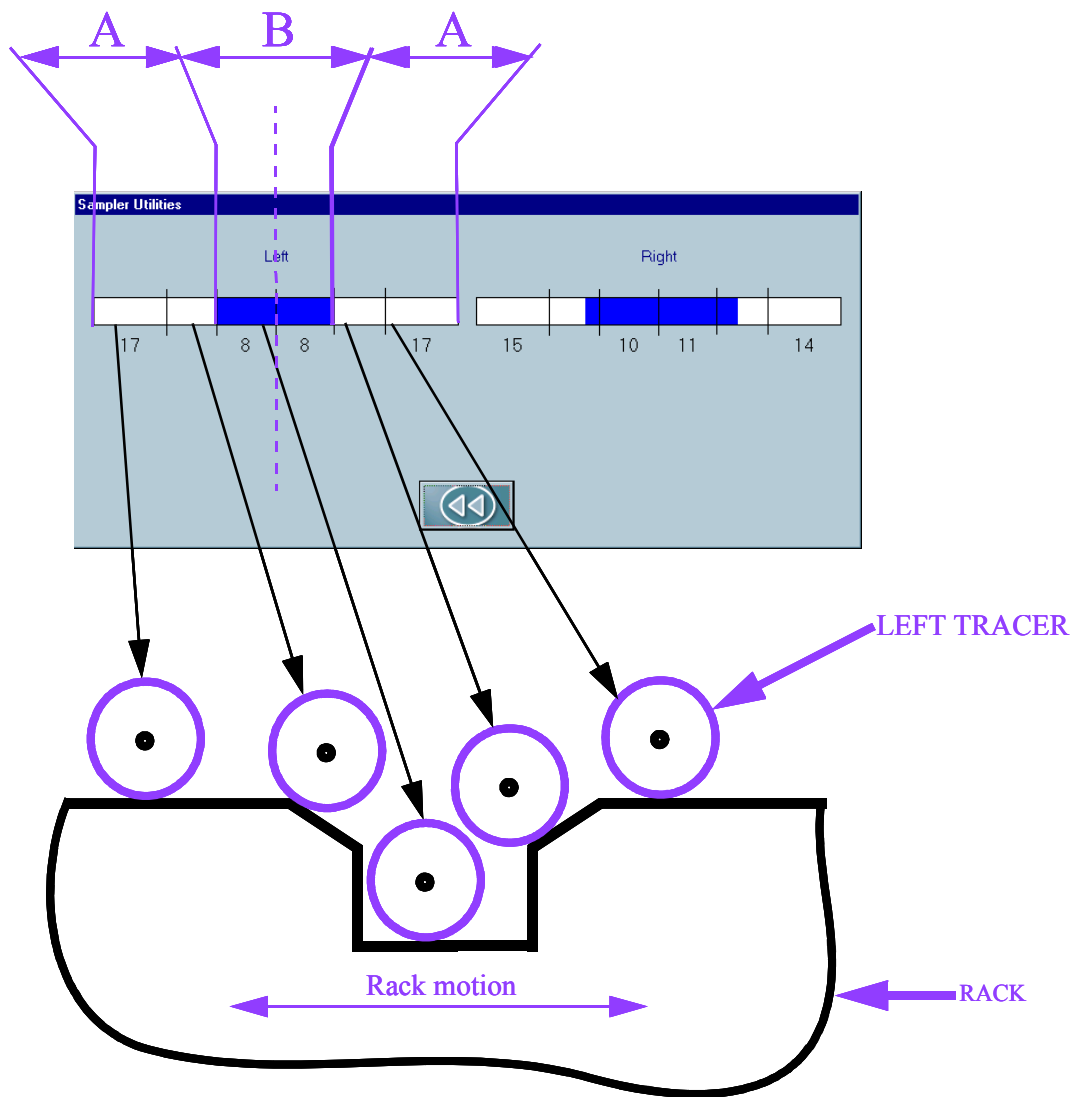
If non-detection zone is on right, decrease «First Transfer» value.

If non-detection zone is on left, increase «First Transfer» value.

Adjust it to have 9 +/-2 motions on each side of the middle bar (See Diag.9 «**Tracers detection**», page 8).

Tracers (followers) position adjustments are factory made and non-detection zone (B) width is depending on tracers up and down position.

If you have to move left tracer, for example during mixer replacement, keep right tracer for reference.



Diag.9 Tracers detection

## Internal PC Replacement Procedure

RAS348B

\_\_\_\_\_



- Concerns

Dismantling of the internal PC

- Required tools

Allen keys

- Required products

None

- Intervention time

10 min.

- Frequency

On request

- Specific kit or consumables

- For Pentra 80:
  - XAA553CS Kit
- For Pentra XL 80:
  - XBA596BS Kit



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. PC dismantling



PC Hard Disk may contains some user's specific datas (Worklist, Archives, etc...) if the PC is replaced these informations won't be accessible.

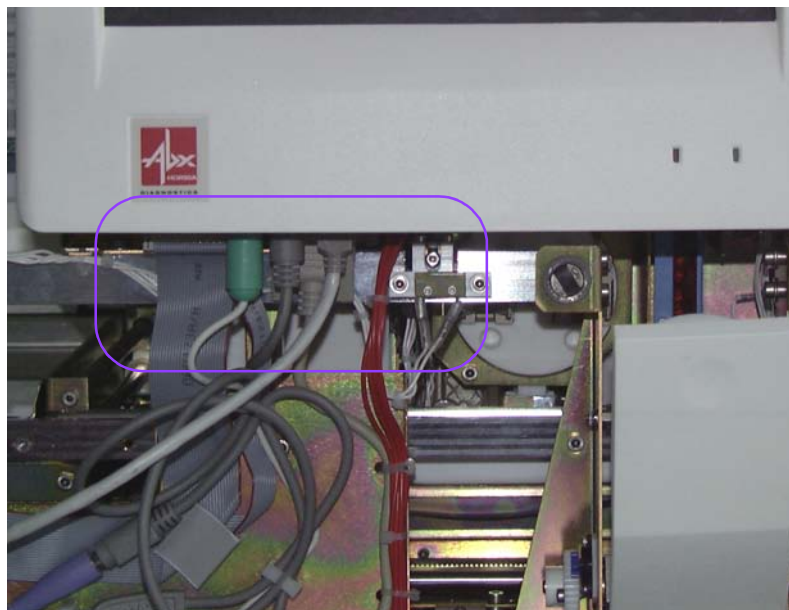
Read technical note included in the kit before replacing the PC assembly.

Switch the instrument off and disconnect power supply cable.

Remove the side and top covers of the instrument (for further details refer to procedure RAS342 Front panel & Covers dismantling)

Disconnect PC's accessories (See Diag.1 "PC disconnection", page 2):

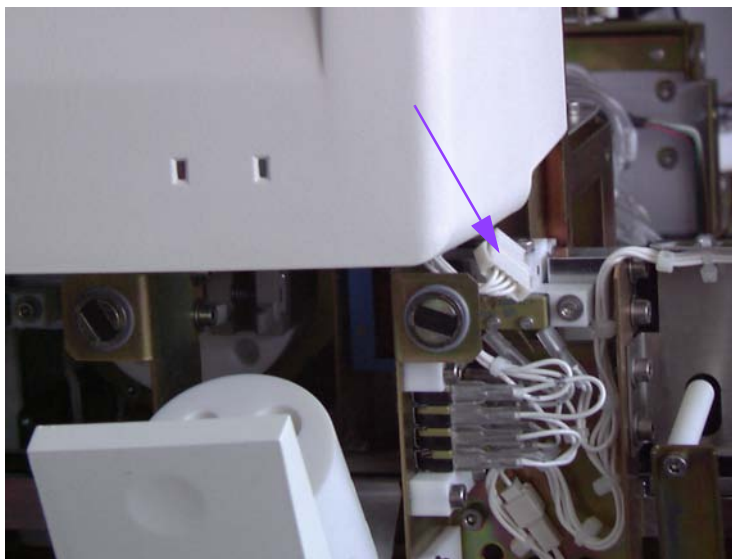
- Mouse,
- Keyboard,
- RS and Printer ports,
- Local network.



*Diag.1 PC disconnection*

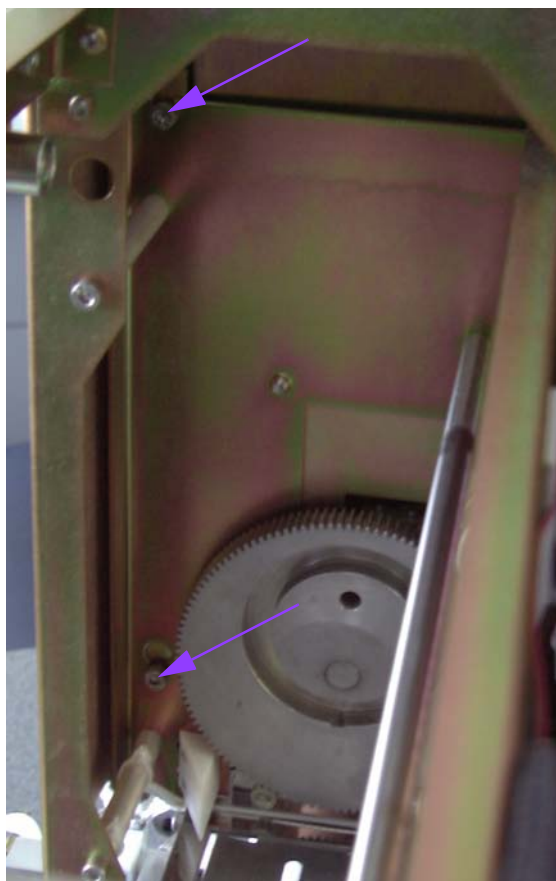
Disconnect the LED connector (See Diag.2 "LED connector", page 3).



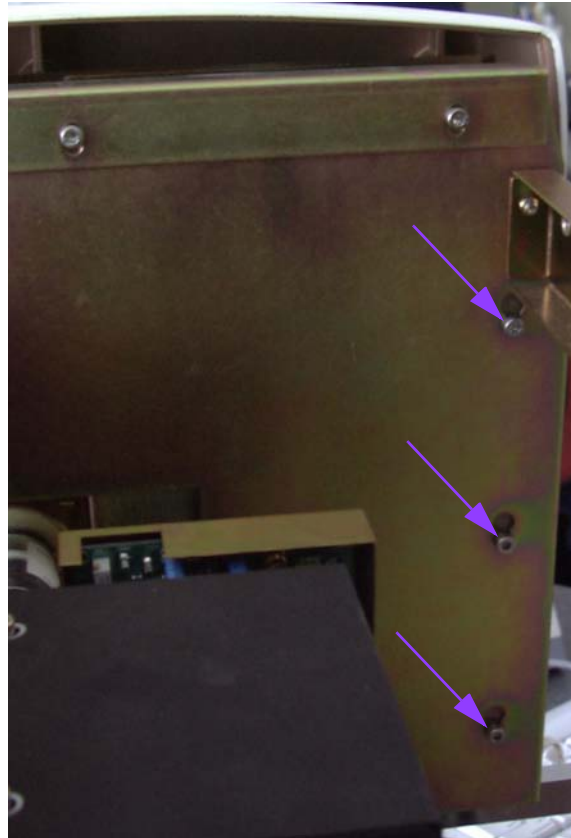


Diag.2LED connector

Untight the PC fixation screws (See Diag.3“[Righthand side PC fixation screws](#)”, page 3 & See Diag.4“[Lefthand side PC fixation screws](#)”, page 4).



Diag.3Righthand side PC fixation screws



*Diag.4 Lefthand side PC fixation screws*

Lift and carefully remove the PC.

## 2. PC installation

Install the PC and tight the fixation screws (See [Diag.3 "Righthand side PC fixation screws"](#), page 3 & See [Diag.4 "Lefthand side PC fixation screws"](#), page 4).

Connect the PC's accessories (See [Diag.1 "PC disconnection"](#), page 2).

Connect the LED connector (See [Diag.2 "LED connector"](#), page 3).

Connect the main supply and start the instrument.

Logon and check the instrument works properly.

## PC Hard Disk Replacement Procedure

RAS349B



- Concerns

PC Hard Disk replacement

- Required tools

Allen Keys

- Required products

None

- Intervention time

1 hour

- Frequency

On request

- Specific kit or consumables

- For Pentra 80:
  - XAA510CS Kit.
- For Pentra XL 80:
  - XAA546AS Kit.



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.



If it's possible, save and/or print configuration before following this procedure (See RAS 357).  
Read technical note included in the kit before replacing the Hard disk.

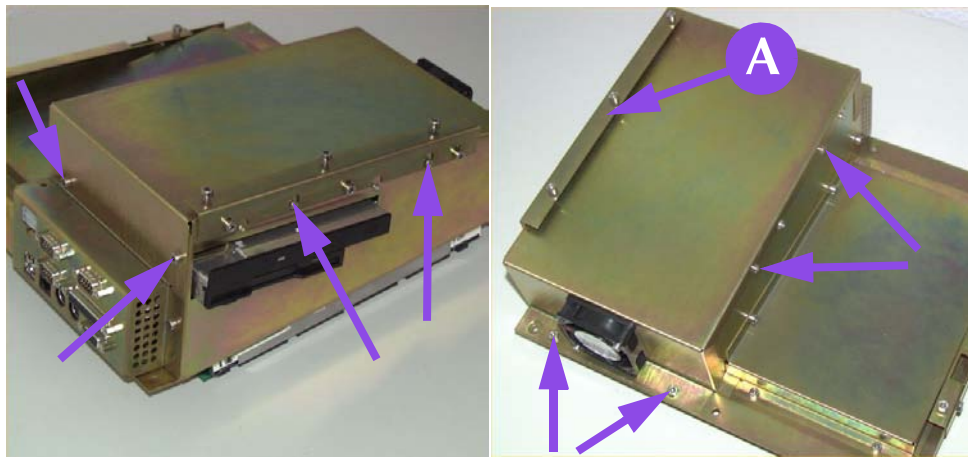
Remove internal PC (See RAS348).

Unscrew the 6 CHC M4x6 screws to remove Internal PC from the cover.

Unscrew the 4 CHC M3x6 and the 4 CHC M4x6 screws (See "Cover plate + fan", page 2).



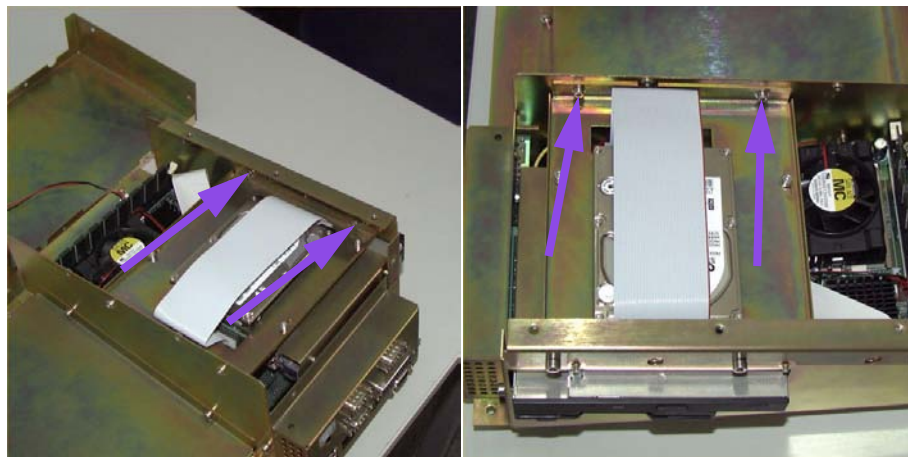
Do not remove Left Angle Plate (A) in order to keep the PC/Cover adjustment.



Diag.1 Cover plate + fan

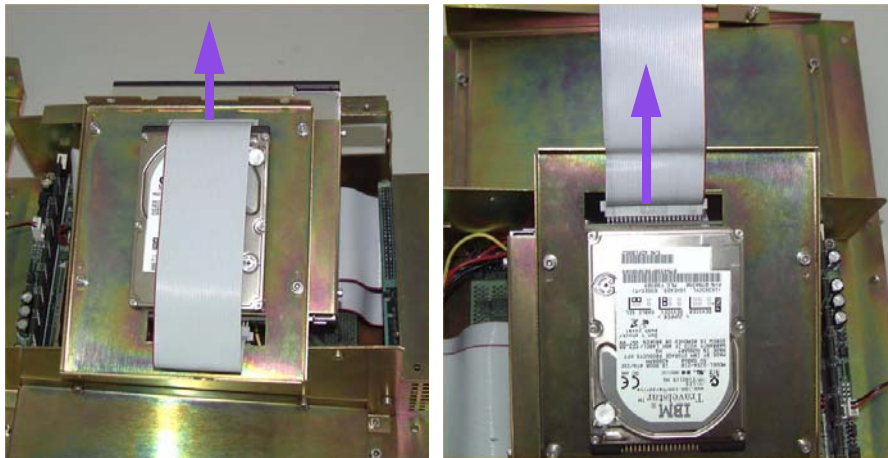
Disconnect fan and remove cover plate.

Unscrew the 4 CHC M3x6 screws + M3 Washers and lift «Hard disk + CD-ROM Drive + Floppy Reader» assy (See "Hd assy screws", page 2).



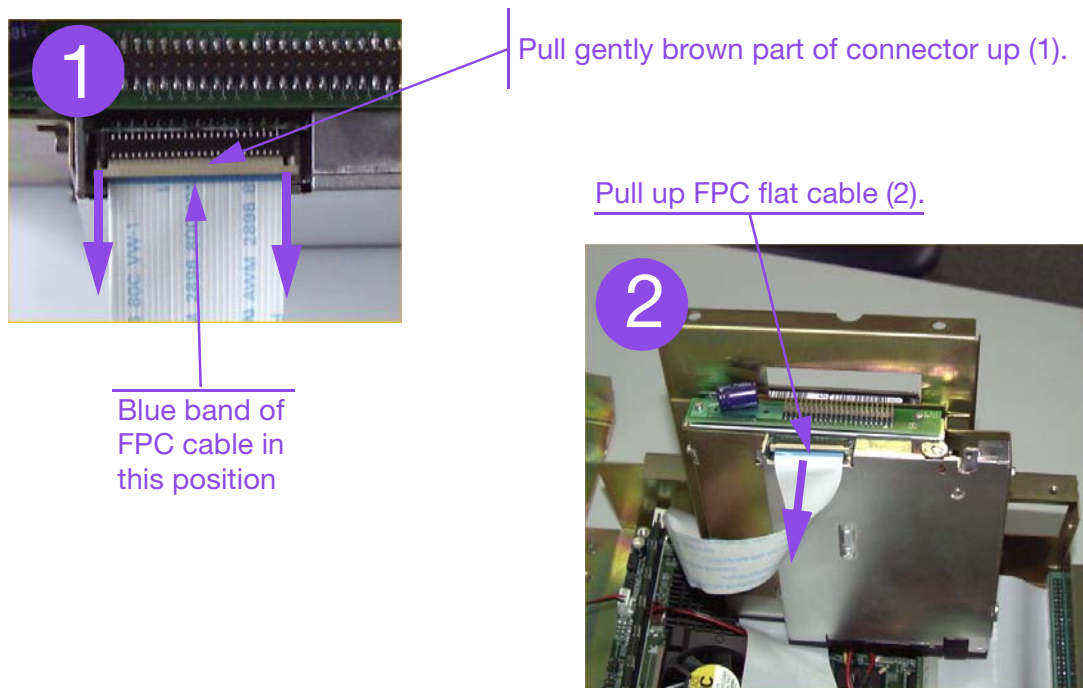
Diag.2 Hd assy screws

Disconnect flat cable from Hard Disk, then from CD-ROM Drive (See “[Flat cable disconnection](#)”, page 3).



Diag.3 Flat cable disconnection

Disconnect FPC cable from Floppy disk Reader and remove Drives Support with Hard Disk, Floppy Disk Reader and CD-ROM Reader (See “[Floppy disk reader connection](#)”, page 3).



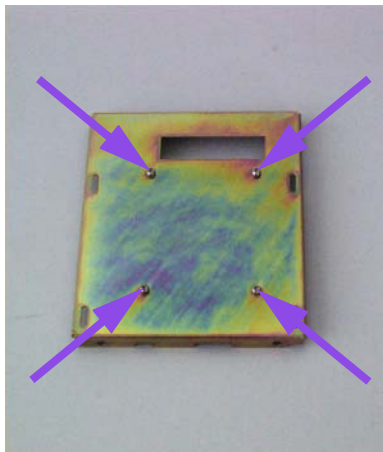
Diag.4 Floppy disk reader connection

Unscrew the 4 CHC M3x4 screws and remove Drives Support with Hard Disk (See “[Drives support](#)”, page 4).



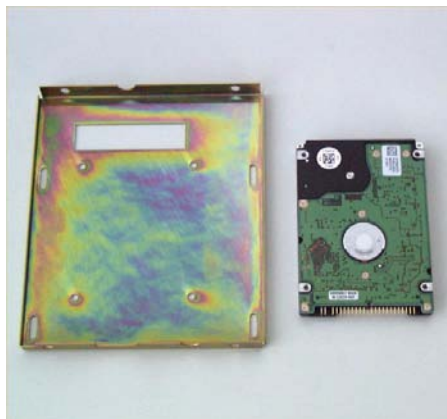
*Diag.5 Drives support*

Return Drives Support and unscrew the 4 CHC M3x4 screws to free Hard Disk (See “[hard disk screws](#)”, page 4).



*Diag.6 hard disk screws*

Remove Drives Support (See “[Hard disk](#)”, page 4).



*Diag.7 Hard disk*

Change Hard Disk.

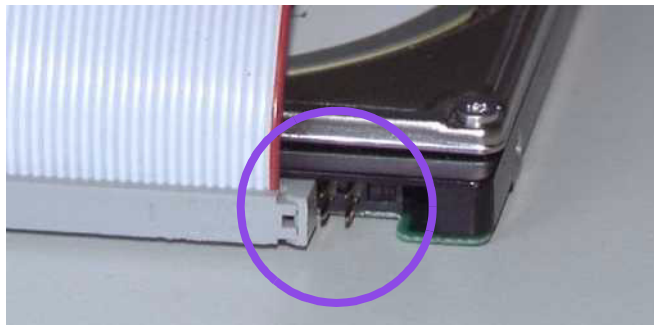


Hard Disk (reference XAA510AS) is formatted and updated with last version of software.

Reassemble in reverse order.



Make sure that the flat cable connector is correctly plugged on Hard Disk because 4 pin are free (See "Hard disk connector", page 5) and that blue band on FPC cable (Floppy disk reader connector) is in the correct position (See "Floppy disk reader connection", page 3).



*Diag.8 Hard disk connector*

Restart system and restore configuration (See RAS357).







## PC Mother Board Replacement Procedure

RAS350B

\_\_\_\_\_



- Concerns

PC Mother board replacement

- Required tools

- Allen Keys
- Flat Screwdriver

- Required products

None

- Intervention time

1 hour

- Frequency

On request

- Specific kit or consumables

Mother Board kit: XAA509BS



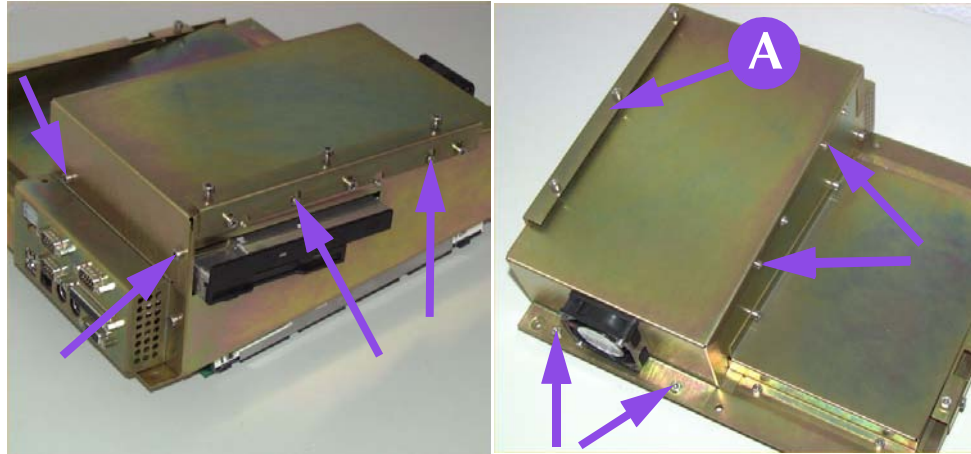
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.  
Remove internal PC (See RAS348).

Unscrew the 6 CHC M4x6 screws to remove Internal PC from the cover.

Unscrew the 4 CHC M3x6 and the 4 CHC M4x6 screws (See “Cover plate + fan”, page 2).



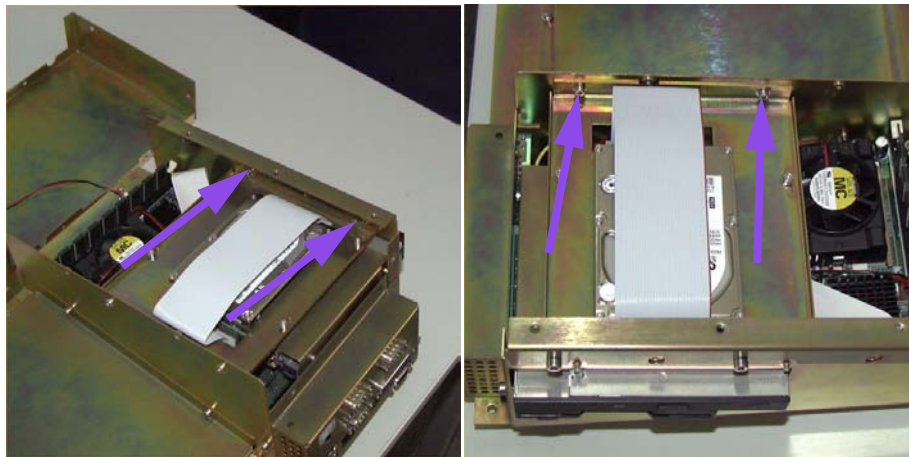
Do not remove Left Angle Plate (A) in order to keep the PC/Cover adjustment.



Diag.1 Cover plate + fan

Disconnect fan and remove cover plate.

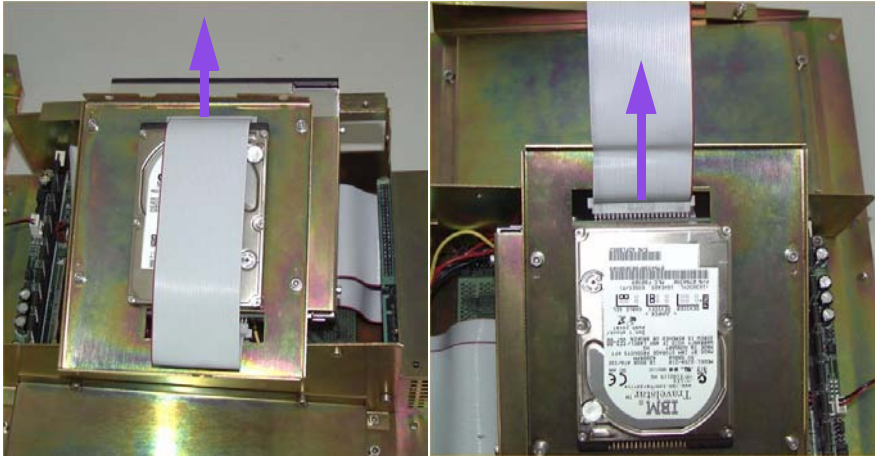
Unscrew the 4 CHC M3x6 screws + M3 Washers and lift «Hard disk + CD-ROM Drive + Floppy Reader» assy (See “Hd assy screws”, page 2).



Diag.2 Hd assy screws

Disconnect flat cable from Hard Disk, then from CD-ROM Drive (See “Flat cable disconnection”,

page 3).



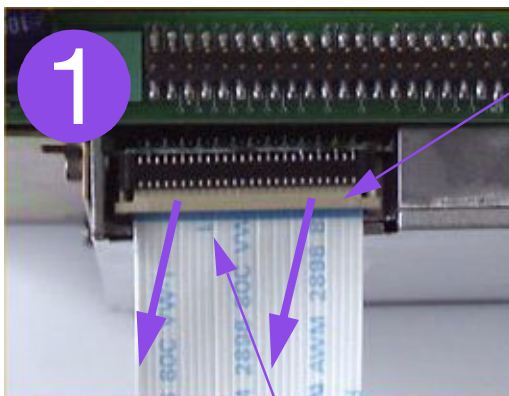
Diag.3 Flat cable disconnection



Before to disconnect FPC flat cable, pull gently on brown part of connector (1) to free the flat cable (See “Floppy disk reader connection”, page 3).

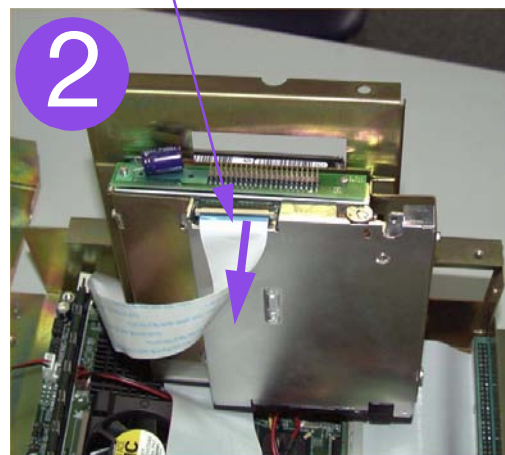
Disconnect FPC cable (2) from Floppy disk Reader (See “Floppy disk reader connection”, page 3).

Remove Drives Support with Hard Disk, Floppy Disk Reader and CD-ROM Reader.



pull gently brown part of connector up (1).

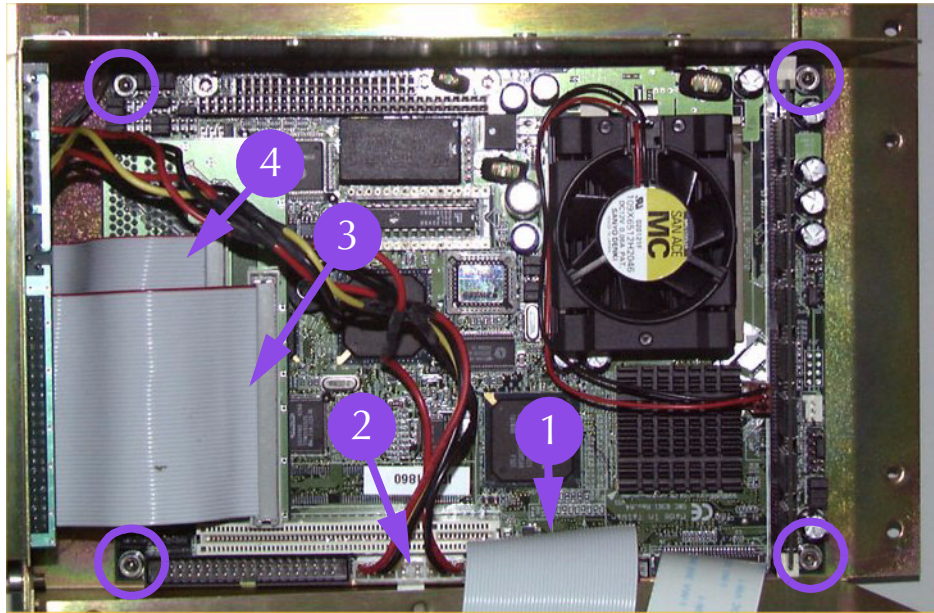
Pull up FPC flat cable (2).



Diag.4 Floppy disk reader connection

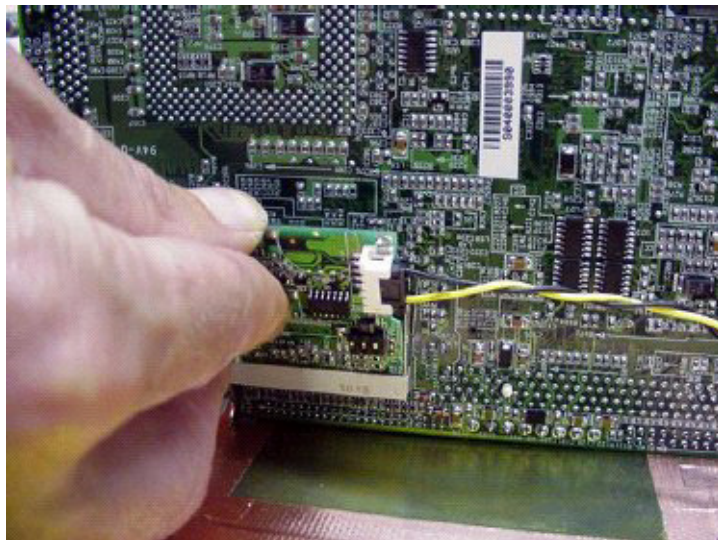
Disconnect, Hard Disk / CD-ROM Drive «44 points» flat cable (1), Power cable (2, use a flat screwdriver) and the 2 «50 points» flat cables (3 and 4) on the daughter board (See “Mother board”,

page 4).



Diag.5 Mother board

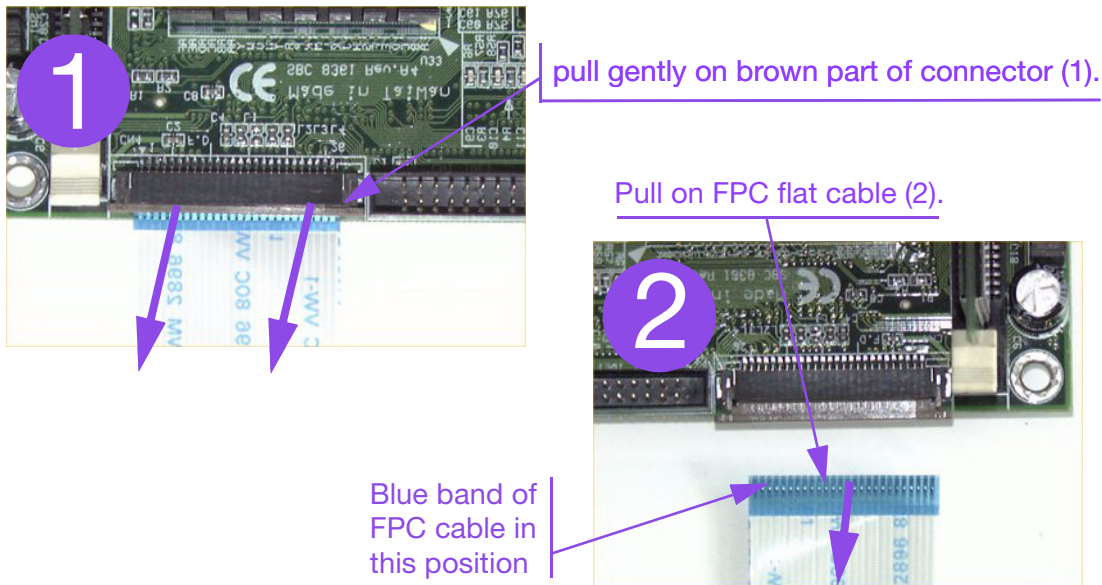
Unscrew the 4 CHC M4x10 screws (See “Mother board”, page 4).  
Remove TFT Board located under Mother board (See “TFT board”, page 4).



Diag.6 TFT board

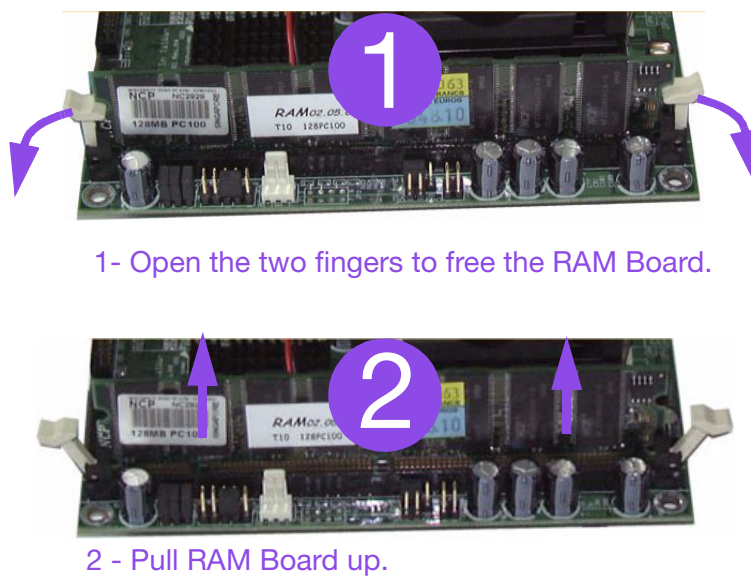
Remove Mother Board and disconnect FPC flat cable (See “FPC flat cable connection”, page 5).





Diag.7 FPC flat cable connection

Remove SDRAM Board (See “SDRAM disconnection”, page 5).

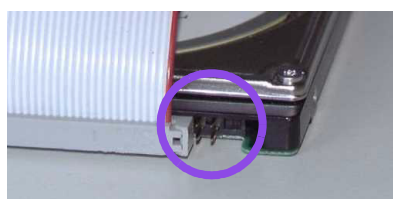


Diag.8 SDRAM disconnection

Change Mother Board (reference: XAA509BS) and reassemble in reverse order.



Make sure that the flat cable connector is correctly plugged on Hard Disk because 4 pin are free (See “Hard disk connector”, page 5) and that blue band on FPC cable (Floppy disk reader connector) is in the correct position on Floppy disk (See “Floppy disk reader connection”, page 3) and on Mother Board (See “FPC flat cable connection”, page 5).



Diag.9 Hard disk connector



## PC Floppy Disk Reader Replacement Procedure

RAS351B

\_\_\_\_\_



- Concerns

PC floppy disk reader replacement

- Required tools

Allen Keys

- Required products

None

- Intervention time

1 hour

- Frequency

On request

- Specific kit or consumables

Floppy disk reader:CBT014A



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

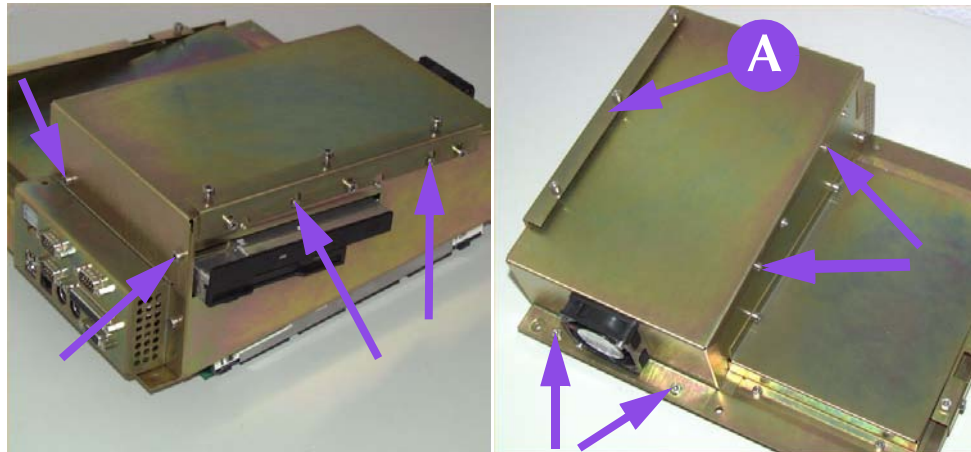
Remove internal PC (See RAS348).

Unscrew the 6 CHC M4x6 screws to remove Internal PC from the cover.

Unscrew the 4 CHC M3x6 and the 4 CHC M4x6 screws (See “Cover plate + fan”, page 2).



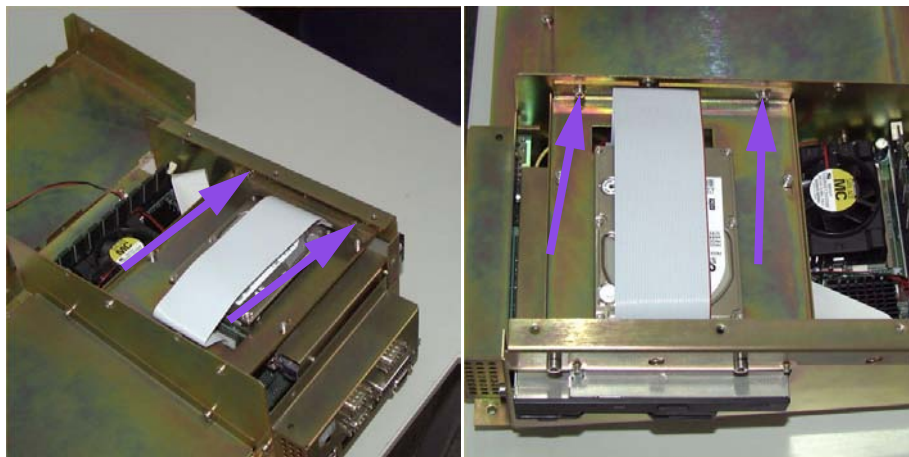
Do not remove Left Angle Plate (A) in order to keep the PC/Cover adjustment.



Diag.1 Cover plate + fan

Disconnect fan and remove cover plate.

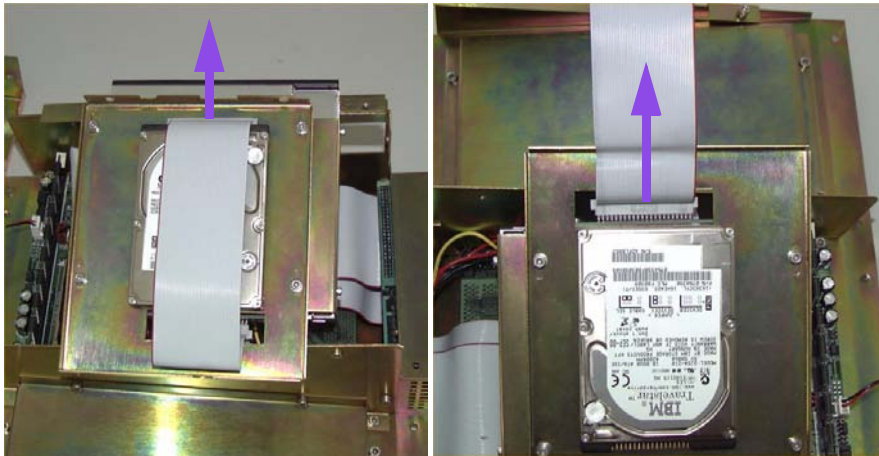
Unscrew the 4 CHC M3x6 screws + M3 Washers and lift «Hard disk + CD-ROM Drive + Floppy Reader» assy (See “Hd assy screws”, page 2).



Diag.2 Hd assy screws

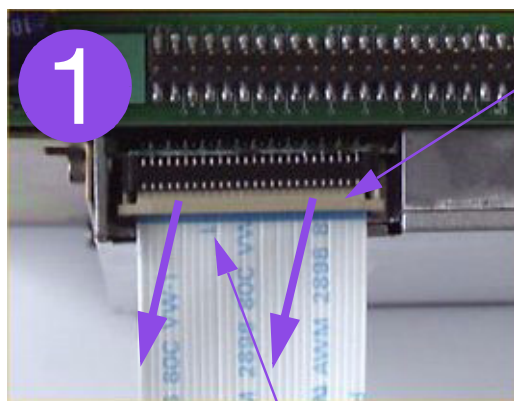
Disconnect flat cable from Hard Disk, then from CD-ROM Drive (See “Flat cable disconnection”, page 3).





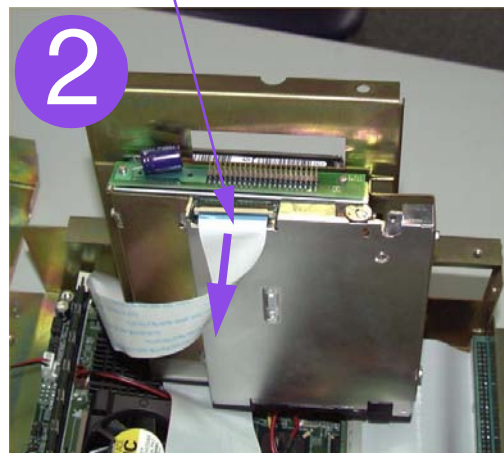
Diag.3 Flat cable disconnection

Disconnect FPC cable from Floppy disk Reader (See “Floppy disk reader connection”, page 3).



pull gently brown part of connector up (1).

Pull up FPC flat cable (2).

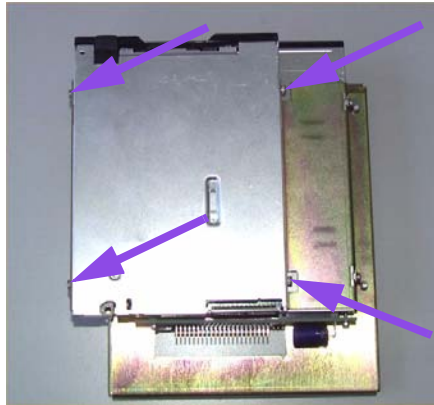


Blue band of  
FPC cable in  
this position

Diag.4 Floppy disk reader connection

Remove Drives Support with Hard Disk, Floppy Disk Reader and CD-ROM Reader.

Unscrew the 4 CHC M2,5x3 then remove Floppy Disk Reader (See “Floppy disk reader screws”, page 4).



Diag.5 Floppy disk reader screws

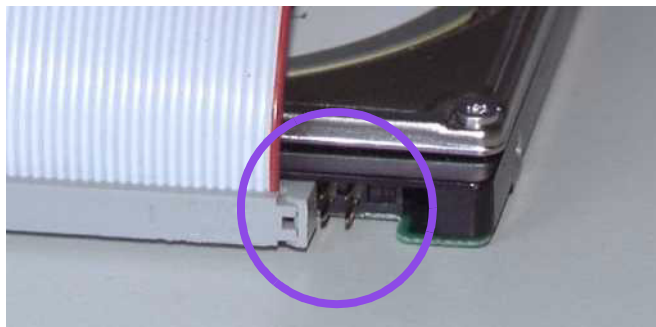
Change Floppy Disk Reader (Reference: CBT014A) and reassemble in reverse order.



Make sure that FPC cable is correctly plugged with the blue band in correct position (See “Floppy disk reader connection”, page 3).



Make sure that the flat cable connector is correctly plugged on Hard Disk because 4 pin are free (See “Hard Disk connector”, page 4)



Diag.6 Hard Disk connector

## PC CD-ROM Drive Replacement Procedure

RAS352B



- Concerns

PC CD-ROM drive replacement

- Required tools

- Allen Keys

- Required products

None

- Intervention time

1 hour

- Frequency

On request

- Specific kit or consumables

CD-ROM Drive: CBT013A



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

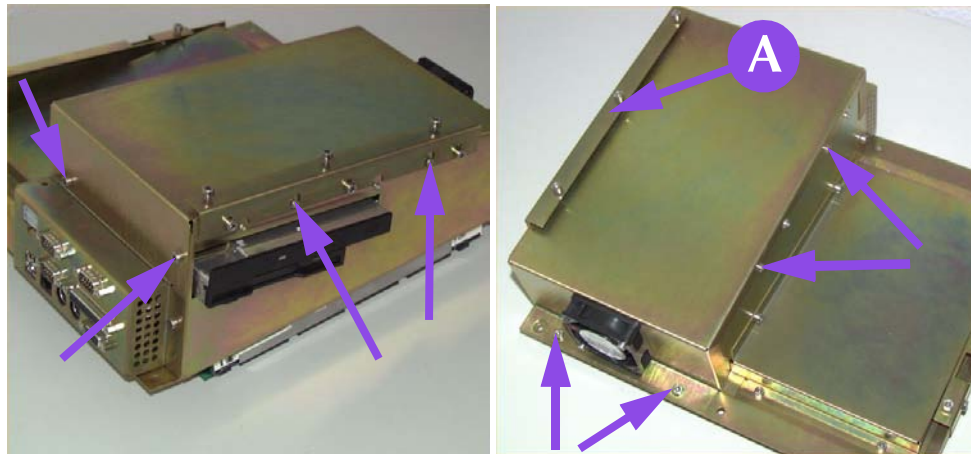
Remove internal PC (See RAS348).

Unscrew the 6 CHC M4x6 screws to remove Internal PC from the cover.

Unscrew the 4 CHC M3x6 and the 4 CHC M4x6 screws (See "Cover plate + fan", page 2).



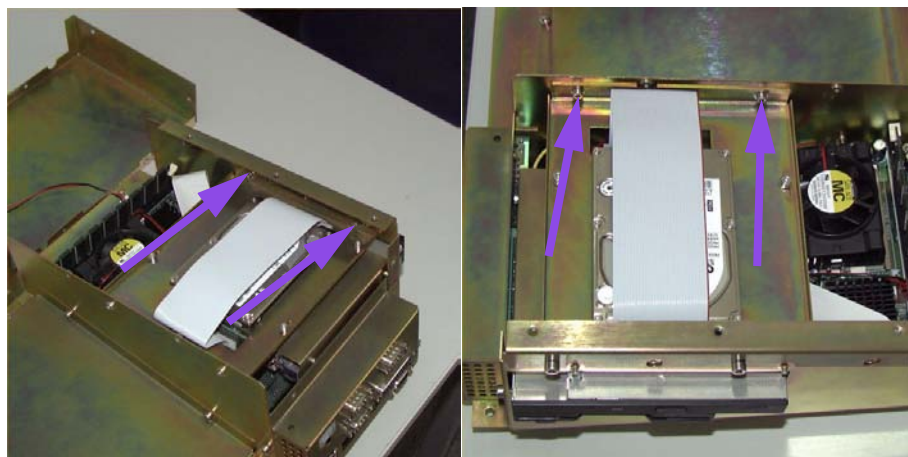
Do not remove Left Angle Plate (A) in order to keep the PC/Cover adjustment.



Diag.1 Cover plate + fan

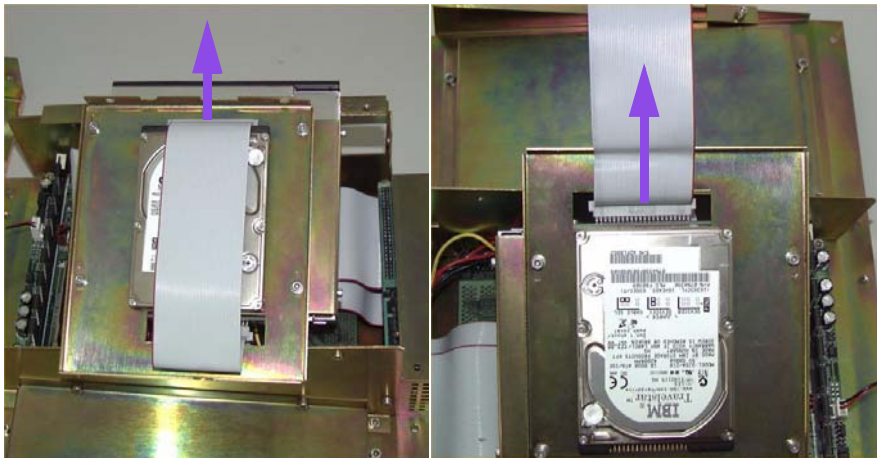
Disconnect fan and remove cover plate.

Unscrew the 4 CHC M3x6 screws + M3 Washers and lift «Hard disk + CD-ROM Drive + Floppy Reader» assy (See "Hd assy screws", page 2).



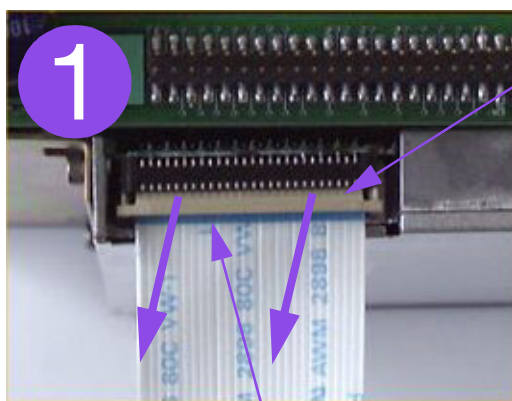
Diag.2 Hd assy screws

Disconnect flat cable from Hard Disk, then from CD-ROM Drive (See “Flat cable disconnection”, page 3).



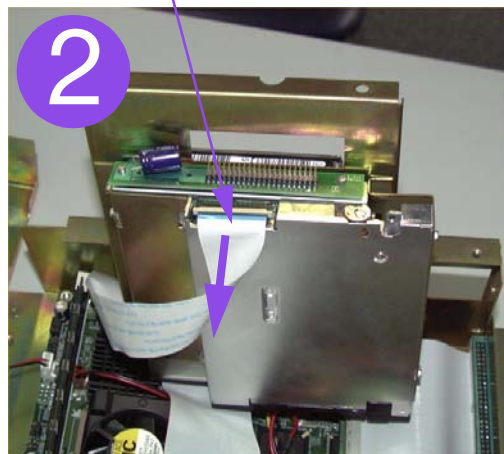
Diag.3 Flat cable disconnection

Disconnect FPC cable from Floppy disk Reader (See “Floppy disk reader connection”, page 3).



pull gently brown part of connector up (1).

Pull up FPC flat cable (2).



Blue band of  
FPC cable in  
this position

Diag.4 Floppy disk reader connection

Remove Drives Support with Hard Disk, Floppy Disk Reader and CD-ROM Reader.

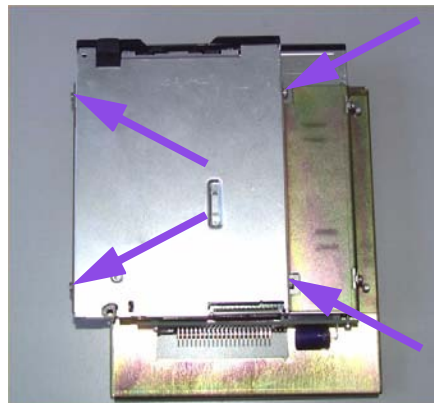


Unscrew the 4 CHC M3x4 screws and remove Drives Support with Hard Disk (See “[Drives support](#)”, page 4).



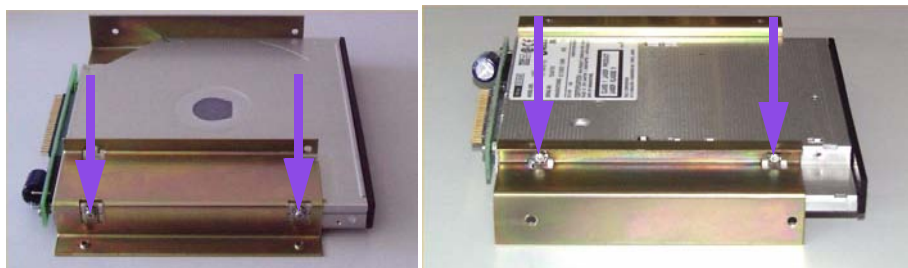
*Diag.5 Drives support*

Unscrew the 4 CHC M2,5x3 then remove Floppy Disk Reader (See “[Floppy disk reader screws](#)”, page 4).



*Diag.6 Floppy disk reader screws*

Unscrew the 4 CHC M2x3 screws, with AZ 2,5 washers (See “[CD-ROM drive screws](#)”, page 4).



*Diag.7 CD-ROM drive screws*

Unscrew the 2 CHC M2x6 screws (See “CD-ROM board”, page 5) and remove board from CD-ROM drive (there is a nut between CD-ROM drive and board).



Diag.8 CD-ROM board

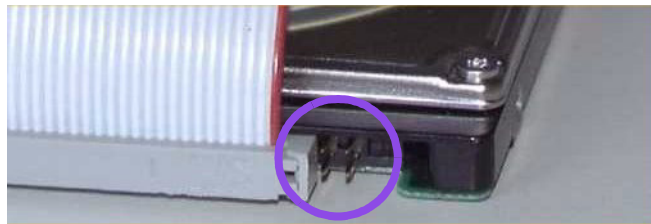
Change CD-ROM drive (Reference CBT013A) and reassemble in reverse order



Make sure that FPC cable is correctly plugged with the blue band in correct position (See “Floppy disk reader connection”, page 3).  
Do not tighten too much different screws in order to not damage CD-ROM drive.



Make sure that the flat cable connector is correctly plugged on Hard Disk because 4 pin are free (See “Hard Disk connector”, page 5)



Diag.9 Hard Disk connector





## PC Touch screen Replacement Procedure

RAS353B



- Concerns

PC Touch screen replacement

- Required tools

Allen Keys

- Required products

None

- Intervention time

1 hour

- Frequency

On request

- Specific kit or consumables

PC touch screen: XAA511AS



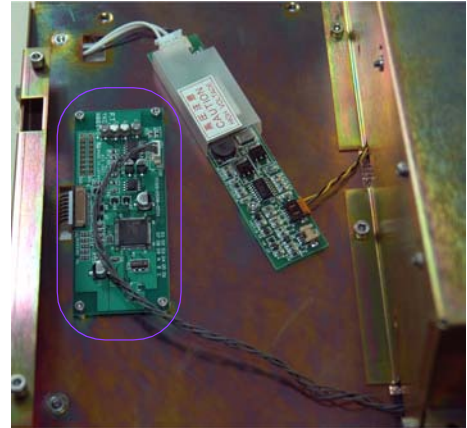
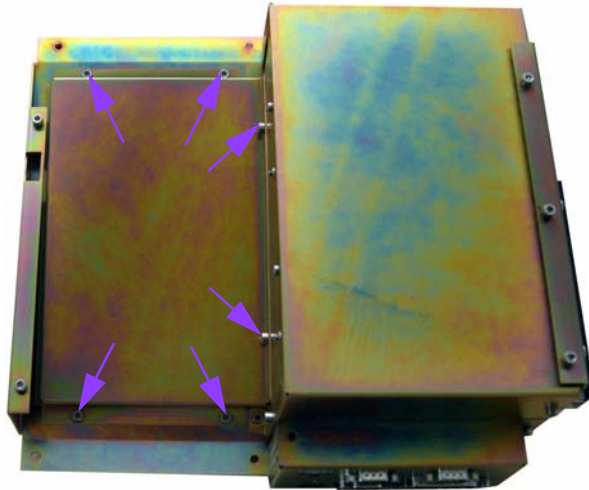
Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Touch screen dismantling

Remove internal PC (See RAS348).

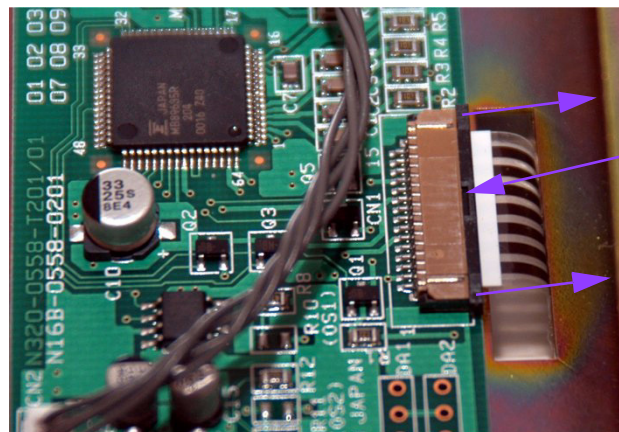
Unscrew the 6 CHC M4x6 screws to remove Internal PC from the cover.

Unscrew the 6 CHC M4x6 screws then remove the plate to access to the interface board (See “Touch screen interface board”, page 2).



Diag.1 Touch screen interface board

Disconnect the flat cable from the Touch screen interface board (See “Touch screen connection”, page 2).



Gently pull the black part of the connector up to free the flat cable

Diag.2 Touch screen connection

Depending of the instrument, different cases are possible:

1- The touch screen is stucked on the screen with double side tape:

It will be difficult to remove the touch screen without broken it. Insert a thin blade between the touch screen and the screen then unstick it.

Remove all the glue from the contour of the screen.

Clean the screen.

2- The touch screen is fixed on the screen with 4 pieces of tape.

Cut or remove the 4 pieces of tape then remove the touch screen.

Clean the screen.

## 2. New touch screen installation

Put the new touch screen on the screen, the flat cable should be on the right side.



On new instruments, a square located at the bottom of the screen allow to keep the vertical location of the touch screen.

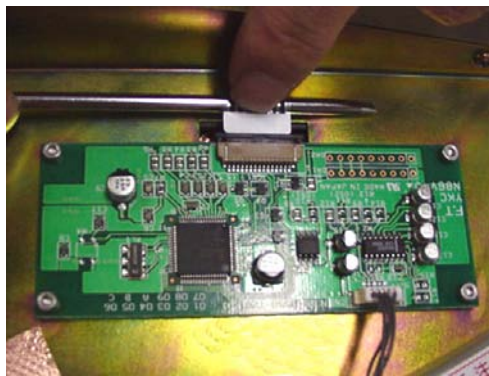
Adjust the touch screen position to have its window centered regard to the window of the screen.  
Fix the touch screen using the tape included in the kit (cut 4 equal pieces).



The tape allow to keep the Touch screen in position before to re-install in the PC Cover.

Use a flat screw driver to connect the flat cable on the interface touch screen board (See “[Interface board connection](#)”, page 3).

Do not forget to block the connector.



Diag.3Interface board connection

Put the plate back then screw it using the 6 CHC screws.

Install the PC in its cover using the 6 CHC screws, take care not to move the touch screen.

Install the PC on the instrument.

### 3. Adjustment

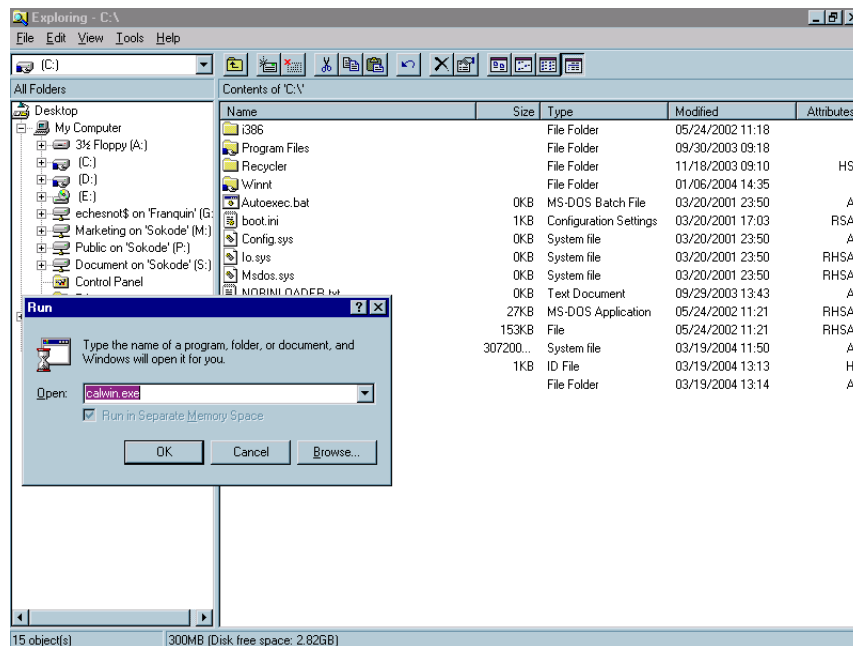
Turn on the instrument.

Enter : **Menu \ Service \ Technician menu \ Others \ System tools**

#### 3.1. For a Pentra 80

Press the «Launch Windows Explorer» button.

Enter: Start \ Run then enter «Calwin.exe» in the window, and press «OK» (See “Run”, page 4).



Diag. 4Run

A white window appears, with a red cross in the left upper corner. Press on this cross, it will move to the next position. Press the red cross for each position then press «Enter», the Touch screen is calibrated.

#### 3.2. For a Pentra XL80

Press the «Launch Windows Explorer» button.

Enter: C:\ FIDTSERV

Launch Setup.exe, then Calwin.exe

A white window appears, with a red cross in the left upper corner. Press on this cross, it will move to the next position. Press the red cross for each position then press «Enter», the Touch screen is calibrated.

## Instrument Mother Board Replacement Procedure

RAS354B

\_\_\_\_\_



- Concerns

Instrument mother board replacement

- Required tools

- Allen Keys
- Voltmeter

- Required products

None

- Intervention time

30 min

- Frequency

On request

- Specific kit or consumables

- For Pentra 80:
  - XAA544AS Kit
- For Pentra XL80:
  - XAA545AS Kit



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.



Before changing a Mother Board, make sure that Analyser Settings are saved on a floppy disk or on Hard disk.

If not, follow RAS357 Procedure «Save and Restore Settings» to save and/or print Analyser Settings.

Read technical note included in the kit before replacing the Mother board.

## 1. Mother Board Acces:

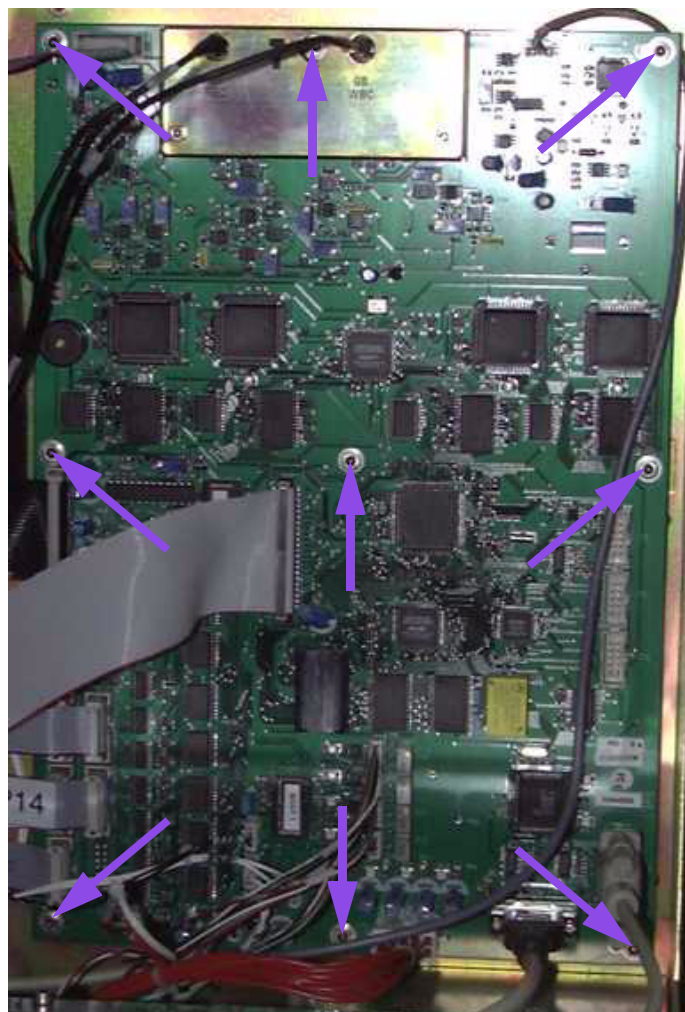
Mother board is located on righthand side of the instrument, at the rear.

- Switch the instrument off and disconnect power supply cable.
  - Remove Right Front Cover.
  - Remove Thermic Panel.
  - Remove Right side cover.
  - Remove the Plastic Protection by loosening the two CHC M4x6 Screws.
- For further details, refer to procedure RAS342 Front panel & Covers dismantling.

## 2. Mother Board Dismantling:

Carefully disconnect all the connectors from the mother board.

Unscrew the 9 CHC M4x 6 Screws (See “Mother board screws”, page 2).



Diag.1 Mother board screws

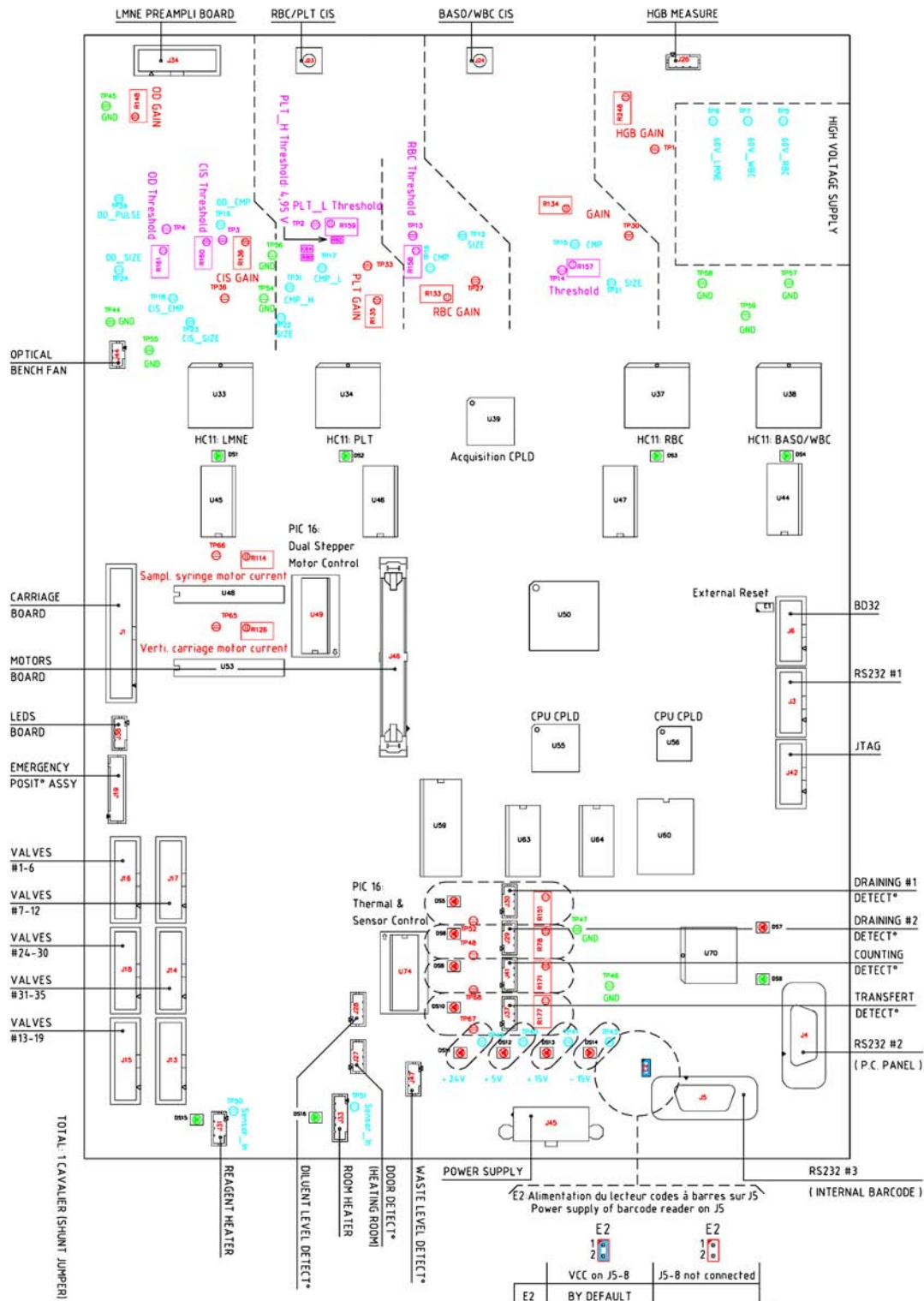
Remove Mother Board.



### 3. Mother Board Replacement:

Install new Mother Board and screw the 9 CHC M4x 6 screws.

Connect all the connectors on the board (See “[Main board connections](#)”, page 3).



Diag.2 Main board connections

Switch on the instrument and adjust Mother Board (See RAS331: Main Board Adjustment).

Restore settings (See RAS357 Save and Restore Settings and follow Technical note included in the kit).

Put back the covers.





## Motor board replacement Procedure

RAS355B

\_\_\_\_\_



- Concerns

Replacement of the motor electronic command board.

- Required tools

- Hexagonal keys
- Voltmeter

- Required products

None

- Intervention time

30min.

- Frequency

On request

- Specific kit or consumables

Motor board: XAA459BS



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. How to access to motor board

The motor board is located under the sampler loader system on the lefthand side of the instrument.

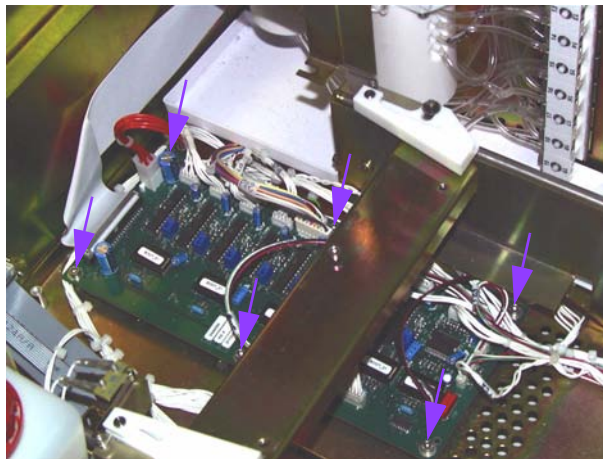
- Lift up the reagent cover and remove the bottles.
- Remove the plastic protection under the reagents.
- Remove the lefthand side panel of the instrument (4 screws).
- Remove the reagent frame under the plastic protection (5 screws).
- Remove the sampler loader inox plate (4 screws).
- Remove the motor board plastic protection (2screws).

For more details about the dismantling of the instrument covers refer to procedure RAS342 Front panel & Covers dismantling.

## 2. Motor board dismantling

Carefully disconnect all the connectors from the motor board.

Unscrew the 6 screws maintaining the board and remove it (See Diag.1 “Motor board dismantling”, page 2).



Diag.1 Motor board dismantling

## 3. Motor board replacement

Install the new board and tight the 6 fixation screws.

Connect all the connectors on the board.

Adjust motor board (See RAS332 Motor Board Adjustment).

Put back the covers.

## Sensors check and adjustment Procedure

RAS356B



- Concerns

Sensors check and adjustment

- Required tools

Allen keys

- Required products

None

- Intervention time

2 hours

- Frequency

On request

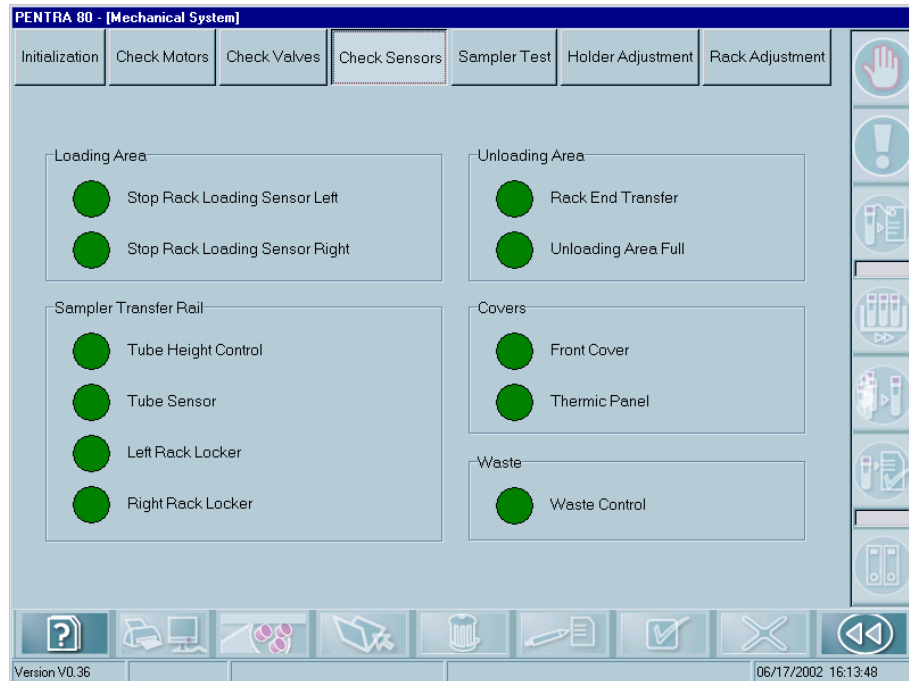
- Specific kit or consumables



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.

## 1. Sensor check:

Enter Menu: **Service/ Super User Menu / Mechanical / Check Sensors** (See “[Check sensors screen](#)”, page 2).



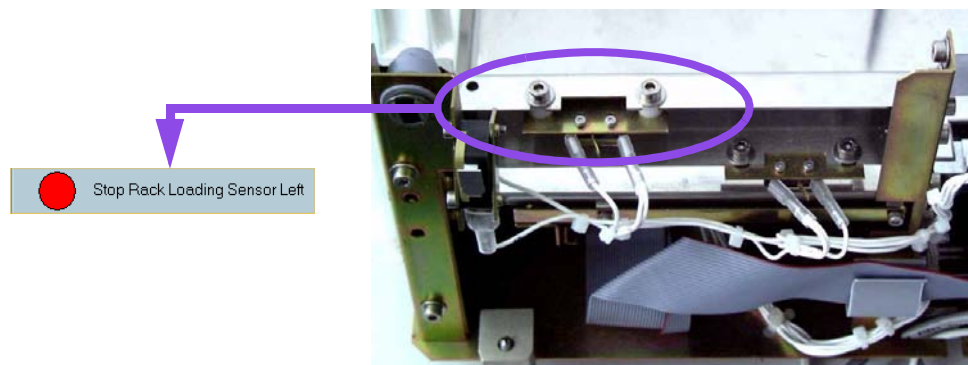
Diag.1 Check sensors screen

### 1.1. Loading area:

Remove **Left Front Cover** (See RAS342) to have acces to switches (Front cover status becomes red on previous screen).

#### Stop Rack Loading Sensor Left:

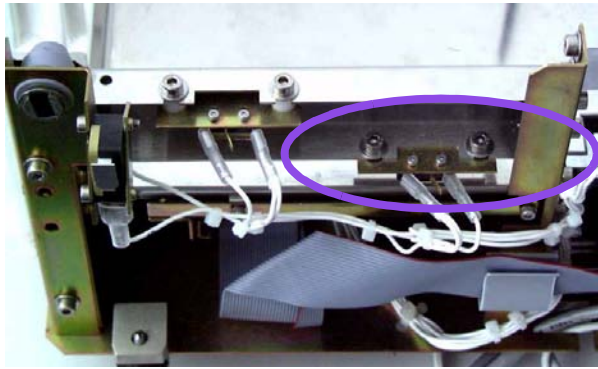
Push on sensor and check that **Stop Rack Loading Sensor Left** status becomes red (See “[Stop rack loading sensor left](#)”, page 2).




Diag.2 Stop rack loading sensor left

#### Stop Rack Loading Sensor Right:

Push on sensor and check that **Stop Rack Loading Sensor Right** status becomes red (See “[Stop rack loading sensor right](#)”, page 3).



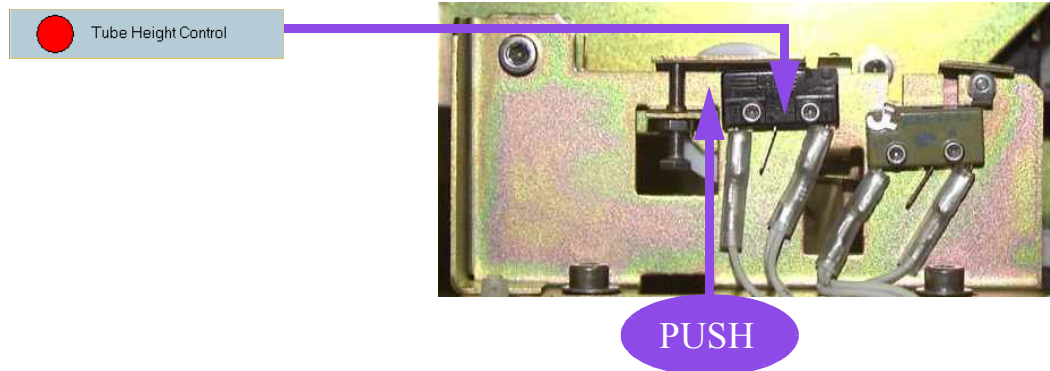
 Stop Rack Loading Sensor Right

Diag.3 Stop rack loading sensor right

## 1.2. Sampler Transfer Rail:

### Tube Height Control:

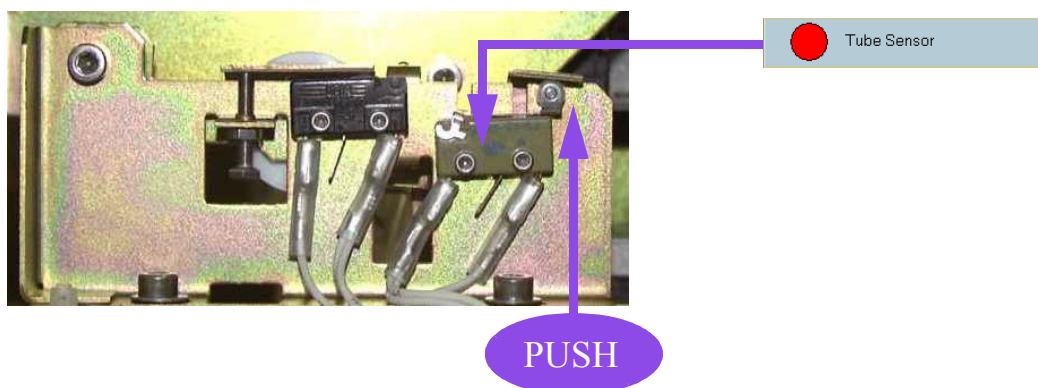
Push on sensor lever and check that **Tube Height Control** status becomes red (See “**Tube height control**”, page 3).



Diag.4Tube height control

### Tube Sensor:

Push on sensor lever and check that **Tube Sensor** status becomes red (See “**Tube sensor**”, page 3).

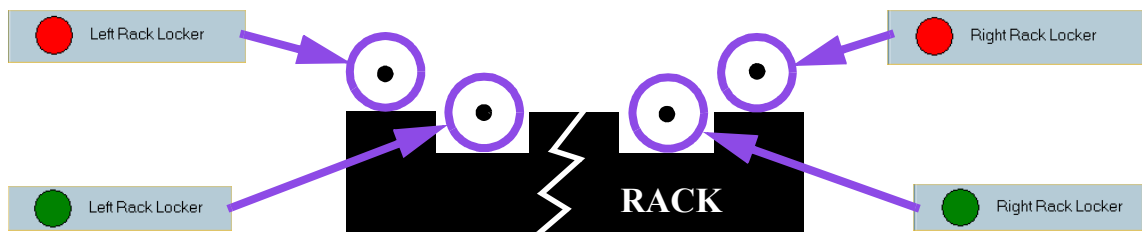


Diag.5Tube sensor

### Left Rack Locker / Right Rack Locker:

Push a rack in the rail until it comes under the tracers (followers) and check that **Left Rack Locker** and **Right Rack Locker** status becomes red when tracers are not in a hole of the rack (See “**Left**

and right rack lockers”, page 4).

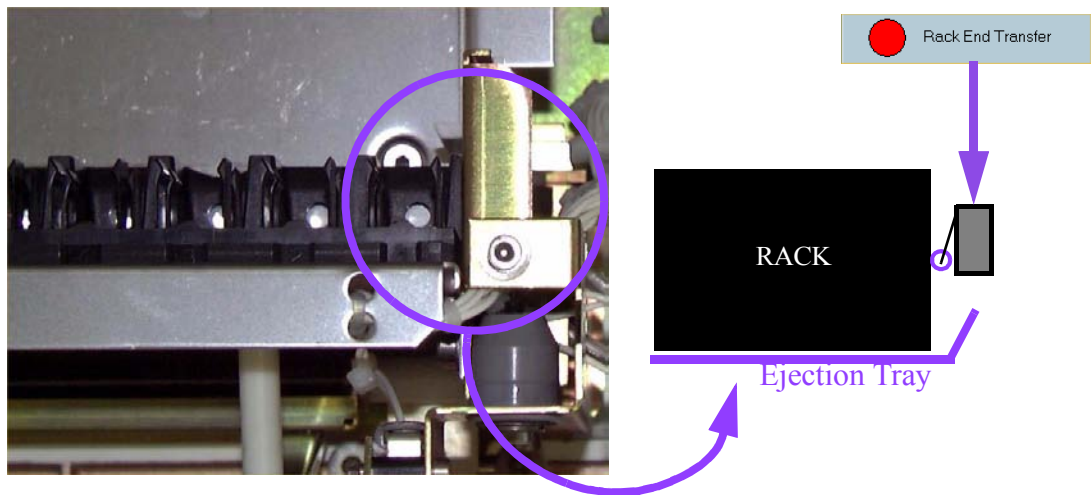


Diag.6 Left and right rack lockers

### 1.3. Unloading area:

#### **Rack End Transfer:**

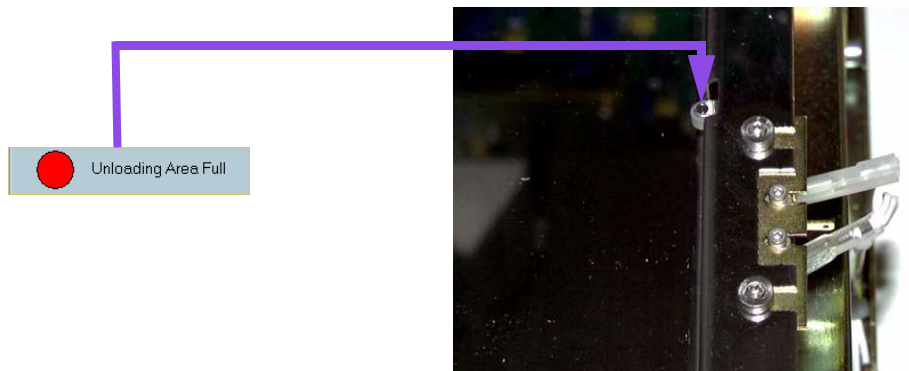
Push a rack in the rail until it comes in mechanical stop against unloading tray and check that **Rack End Transfer** status becomes red (See “**Rack end transfer**”, page 4).



Diag.7 Rack end transfer

#### **Unloading Area Full:**

Push the Unloading Area Full switch and check that **Unloading Area Full** status becomes red (See “**Unloading area full**”, page 4).

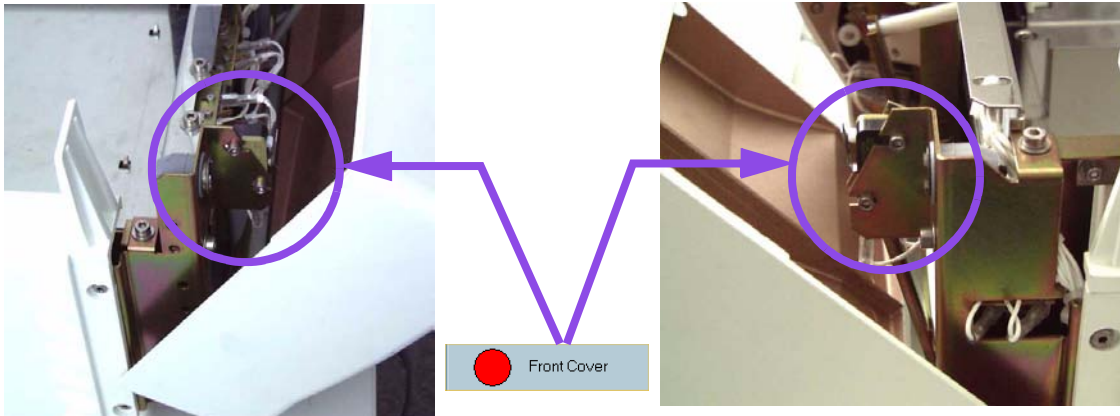


Diag.8 Unloading area full

## 1.4. Covers:

**Front cover:**

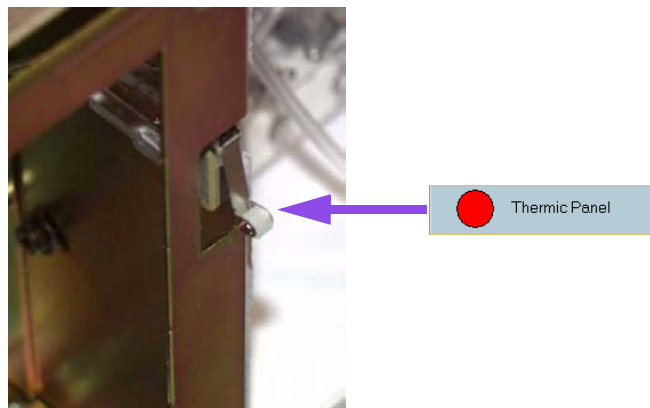
Open **Right Front Cover** and check that Front Cover status becomes red then close it and repeat this operation with **Left Front Cover** (See “Front cover”, page 5).



Diag.9 Front cover

**Thermic Panel:**

Open Thermic Panel and check that **Thermic Panel** status becomes red (See “Thermic panel”, page 5).

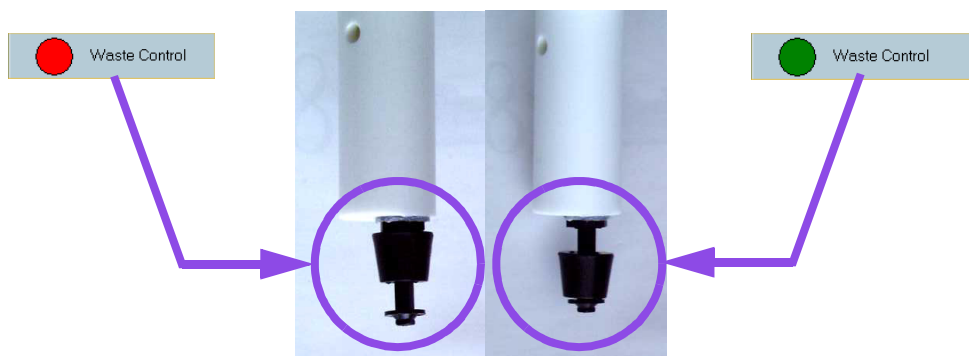


Diag.10 Thermic panel

## 1.5. Waste:

**Waste Control:**

Remove Waste Detector from waste, then move detector from the bottom up and check that **Waste Control** status becomes red (See “Waste control”, page 5).



Diag.11 Waste control



## 2. Sensors Adjustment

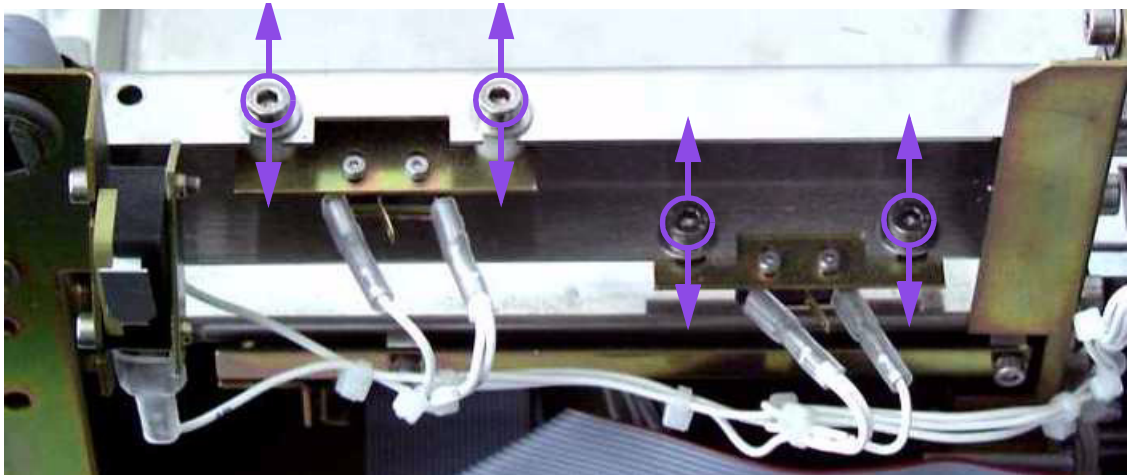
### 2.1. Loading area:

**Stop Rack Loading Sensor Left** (reference:XDA741AS).  
**Stop Rack Loading Sensor Right** (references: XDA742AS).



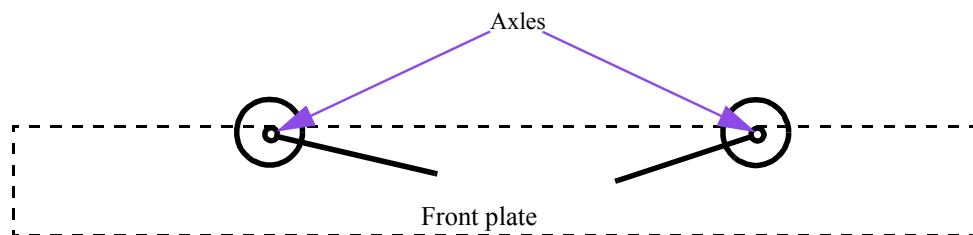
Adjustment of this two sensors is the same. This sensors are delivered on bracket and are prestressed. This adjustment is factory made.

Loosen the CHC M4x12 screws to adjust switch assy (switch + bracket + CHC M2x10 screws + flat nut).



Diag.12 Stop rack loading sensors adjustment

The axle of the switch wheel does not hang out of the front plate in order to not damage switch when rack is moving back (See "Switch wheel position", page 6).

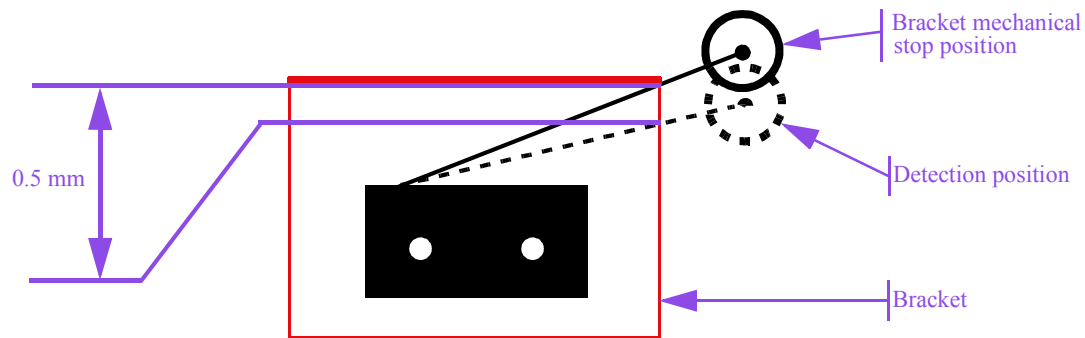


Diag.13 Switch wheel position



If the switch as been moved on bracket, loosen the two CHC M2x10 screws and adjust it on bracket to have the detection after 0.5 mm of moving (See "Bracket / switch adjustment", page 7). Plug a voltmeter in ohmeter positon between the two external pin to check detection. Reference switch alone: CAE019A.





Diag.14 Bracket / switch adjustment

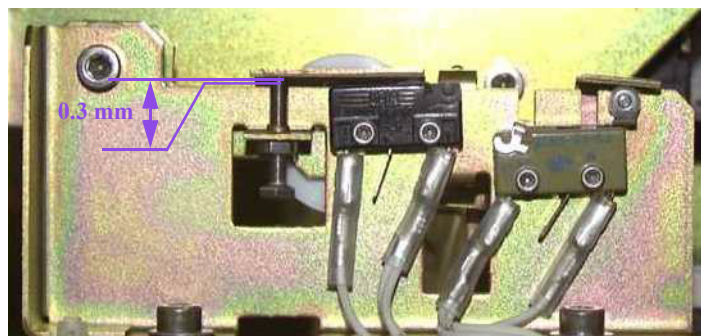
## 2.2. Sampler Transfer Rail:

**Tube Height Control** (reference: CAE10A).



Do not touch the TH M3x16 screw and HU M3 nut.

Unscrew the two CHC M2x10 screws and adjust switch to have detection in this position (See “**Tube height control**”, page 7) and no detection when you put a 0.3 mm gauge between TH M3x16 screw and the plate (See “**Tube height control**”, page 7).



Diag.15 Tube height control

**Tube Sensor** (reference: CAE011A).

Unscrew the two CHC M2x10 screws and adjust switch to have detection when you push a rack with tube under the caster. Keep a little play in this position (See “**Tube sensor switch**”, page 7).



Diag.16 Tube sensor switch

**Left Rack Locker / Right Rack Locker** (reference: CAE010A).

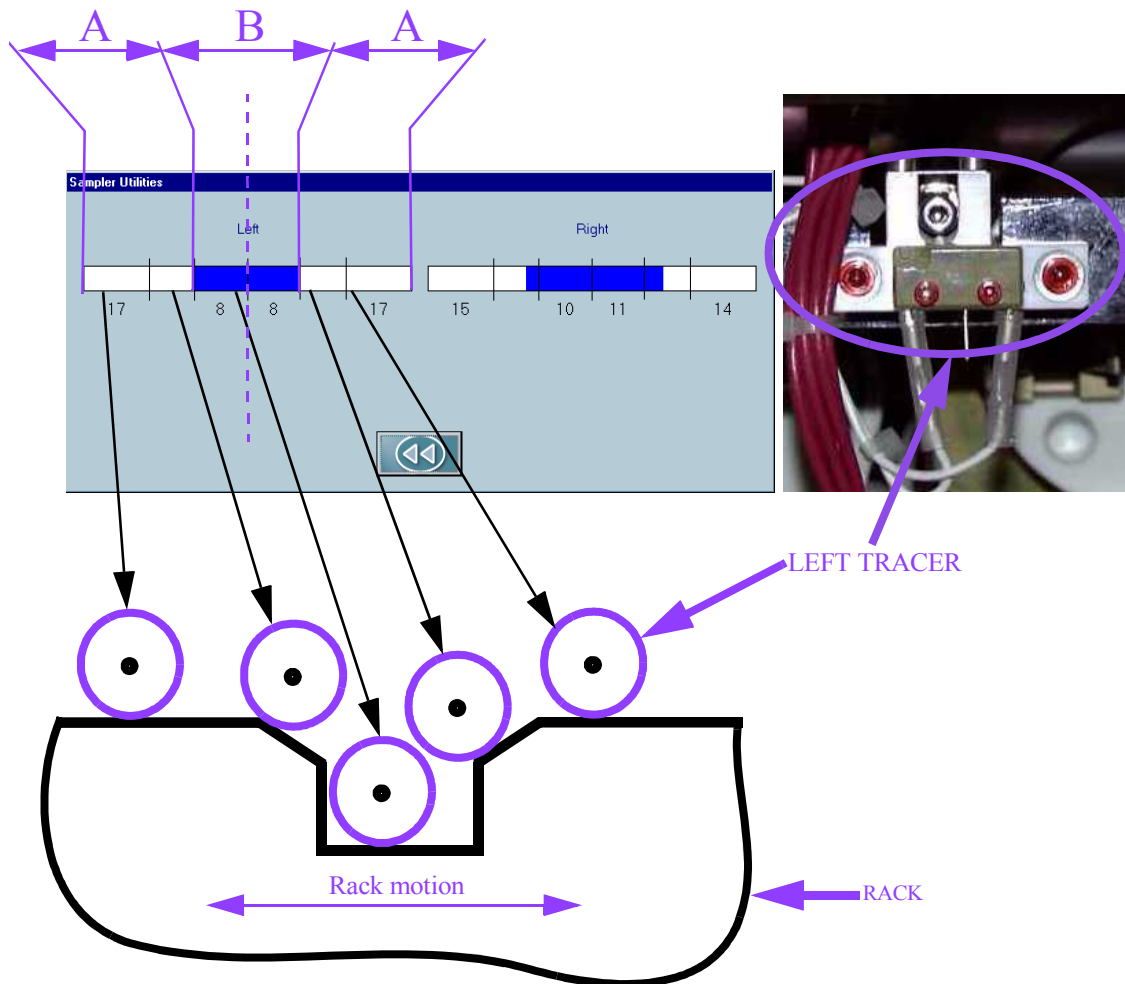
Enter: **Menu\Service\Technician Menu\Gains\Sampler Adjustment**

Put the rack on Loading Tray.

Press **Check Rack Transfer Movement** button.

Rack moves under Tracers (followers), then it run 25 motions on the left and 25 on the right.

The following screen shows the detection (A) and non-detection (B) zones of the Tracer switches  
(See "Tracers detection zone", page 8).



Diag.17 Tracers detection zone

Non-detection zone (B) width is depending on tracer and on switch up and down position.

Loosen the two CHC M2x10 screws and adjust switch position:

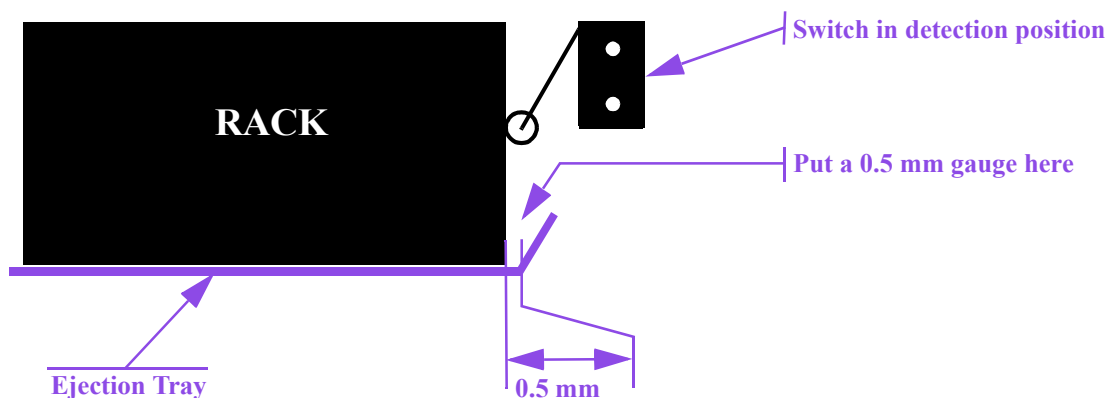
If non detection zone (B) is too small, pull the switch down.

If non detection zone (B) is too large, lift the switch up.

### 2.3. Unloading area:

#### **Rack End Transfer** (reference: CAE011A).

Put a 0.5 mm gauge against Ejection Tray mechanical stop, then push a rack against this gauge. Loosen the two CHC M2x10 screws and adjust Rack End Transfer switch to have detection in this position, then screw the switch (See “[Rack end transfer adjustment](#)”, page 9).



Diag.18 Rack end transfer adjustment

#### **Unloading Area Full** (reference:XDA742AS)



This adjustment is the same that Stop Rack Loading Left and Right Sensors. The switch is prestressed on the bracket (See “[Bracket / switch adjustment](#)”, page 7).Reference of the switch alone: CAE019A.

Adjust the switch/bracket assy in order to be sure that the switch axle hang not out of unloading tray (See “[Switch wheel position](#)”, page 6).

Press a rack against the left side of Ejection Tray (thermic panel side) and push it from the front to the rear. Adjust the switch / bracket assy in order to get detection when the rack comes in front of the switch. The Axle of the switch must not hang out of the Ejection Tray Plate in order to not damage switch if rack is, for example, manually moved.

#### **Covers** (reference: CAE020A).

##### **Front cover**, left and right (reference: CAE020A).

Unscrew the two CHC M3x12 screws and adjust switch position in order to have detection when covers are closed. Keep a little play between switches detection and switches mechanical stop.

##### **Thermic Panel** (reference: CAE006A).

Unscrew the two CHC M2x10 screws and adjust switch position in order to have detection when Thermic panel is closed.Keep a little play between switches detection and switches mechanical stop.

### 2.4. Waste:

#### **Waste Control:**

No adjustment available.

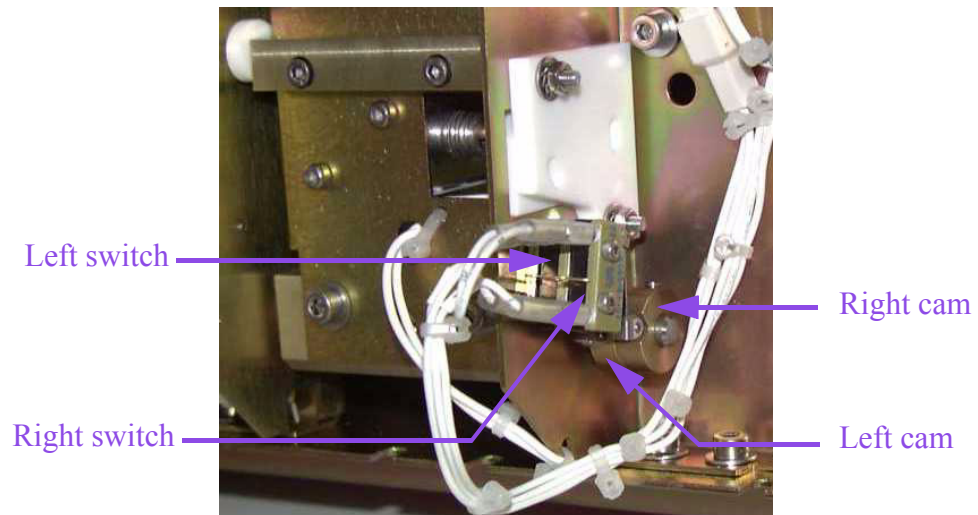
## 2.5. Others:

**Tube holder cam** (reference: CAE006A)

Open tube holder (completely) and adjust the wheel of the left switch in the «V» of the left cam, then screw the switches and the left cam.

Closed the Tube Holder and adjust the right cam to have the wheel of the right switch in the «V» of the cam, then screw gently the right cam.

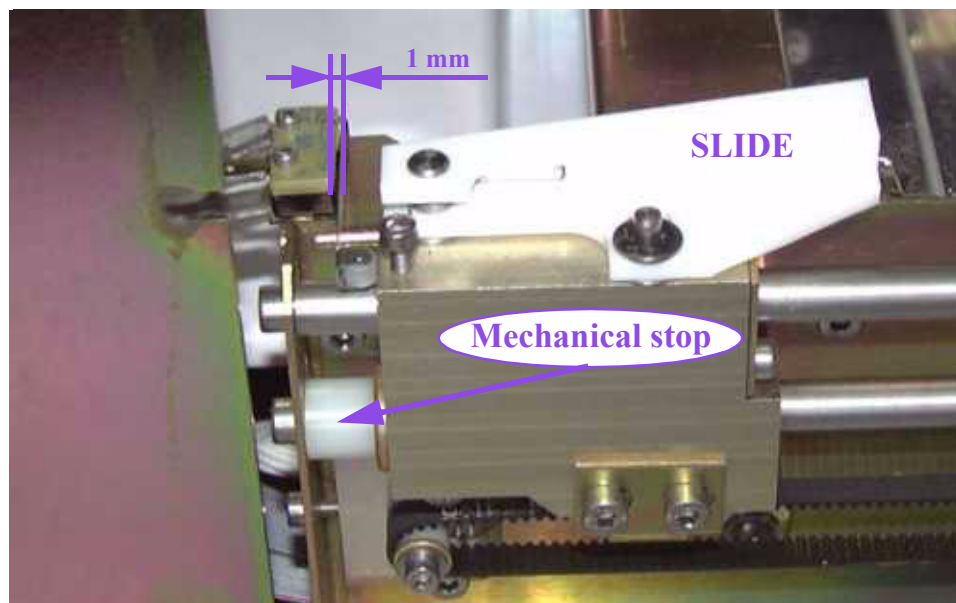
Open the Tube Holder, then close it again. Make sure that the switch detection comes at the same time of the Tube Holder locking and screw the cam.



Diag.19 Tube holder cam

**Home Loader switch** (reference: CAE019A).

Push the slide against the Mechanical stop (ring) and adjust switch to have detection in this position, and keep a play of 1mm on the switch (See "Loader switch", page 10).



Diag.20 Loader switch



- Concerns
  - Workstation setting save and restore
  - Analyzer setting save and restore
  - Analyzer settings printing

- Required tools

Floppy disk

- Required products

None

- Intervention time

30 min

- Frequency

On request

- Specific kit or consumables

None



Disposal gloves and white coat must be worn by the operator.  
Local or national regulations must be applied in all the operations.



For analyser, the followings data are saved:

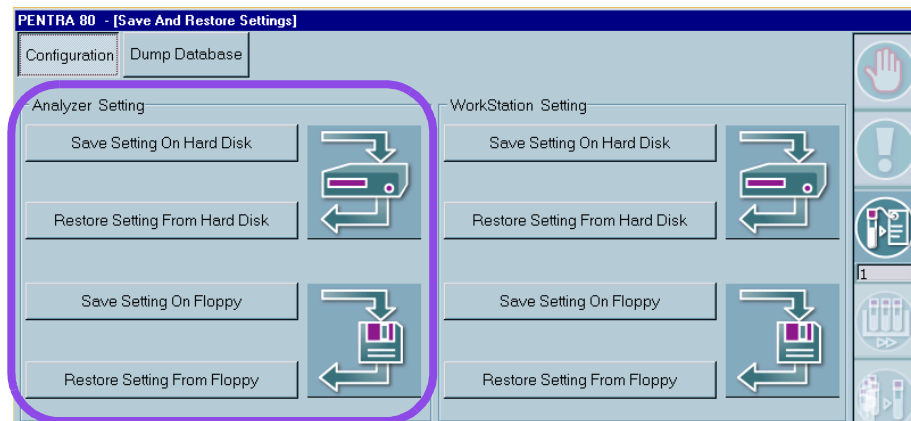
Cycles counter, Reference CTN values, Temperature recorded, Calibration coefficient, Motor Home and Motion Values, Needle Tube Holder Position, Window Counting and Reagent Levels.

For workstation, the followings data are saved:

Types, alarms level, Global Variables, limits level, pathological levels and the version number.

## 1. Analyser setting

Enter: **Menu / Settings / Save-restore / Configuration.**



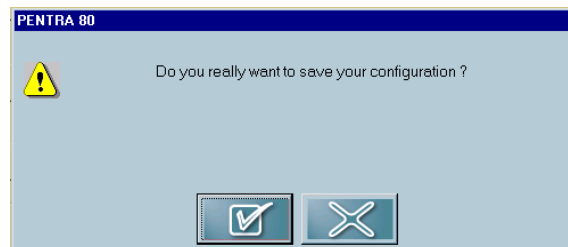
Diag.1 Save restore settings screen

### 1.1. Analyser setting save

On Hard Disk:

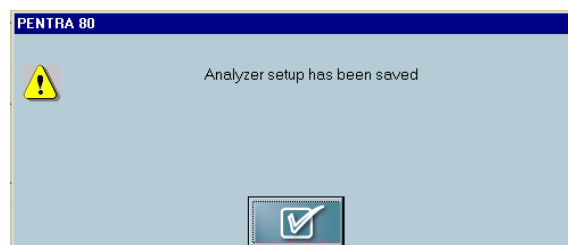
Click on «**Save Setting On Hard Disk**» button to save analyser setting on hard disk (See Diag.1 “Save restore settings screen”, page 2).

Click on Validate button on following screen (See Diag.2 “Validate”, page 2).



Diag.2Validate

When the following screen occurs (See Diag.3 “setup saved”, page 2), click on validate button.



Diag.3setup saved

On Floppy Disk:

Insert a formatted floppy disk in floppy disk reader then click on «**Save Setting On Floppy**» button (See Diag.1 “Save restore settings screen”, page 2) to save analyser setting and follow the same procedure than above.

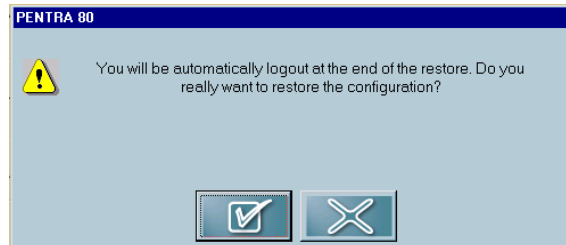


If floppy disk is not formatted, it will be automatically formatted.

## 1.2. Analyser setting restore

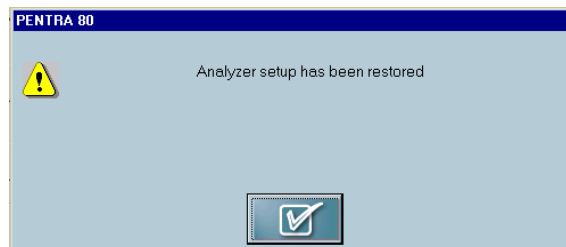
Click on «**Restore Setting From Hard Disk**» button to restore analyser setting from Hard disk (See Diag.1 “[Save restore settings screen](#)”, page 2).

Click on Validate button on following screen (See Diag.4 “[Restore screen](#)”, page 3).



Diag.4 Restore screen

Click on Validate button on following screen (See Diag.5 “[Analyser setup restored](#)”, page 3).



Diag.5 Analyser setup restored



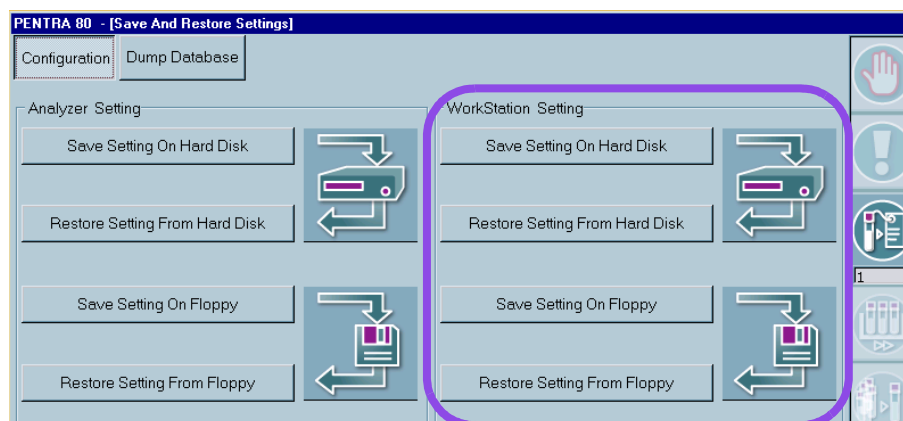
After clicking on this button, you will be automatically logout.

Insert the Floppy Disk where setting has been saved.

Click on «**Restore Setting From Floppy**» button to restore analyser setting from a floppy disk (See Diag.1 “[Save restore settings screen](#)”, page 2) and follow the same procedure than for restore settings from Hard Disk.

## 2. Workstation setting

Follow the same procedure than for Analyser settings, but click on Workstation Buttons (See Diag.6 “[Save restore settings screen](#)”, page 3).



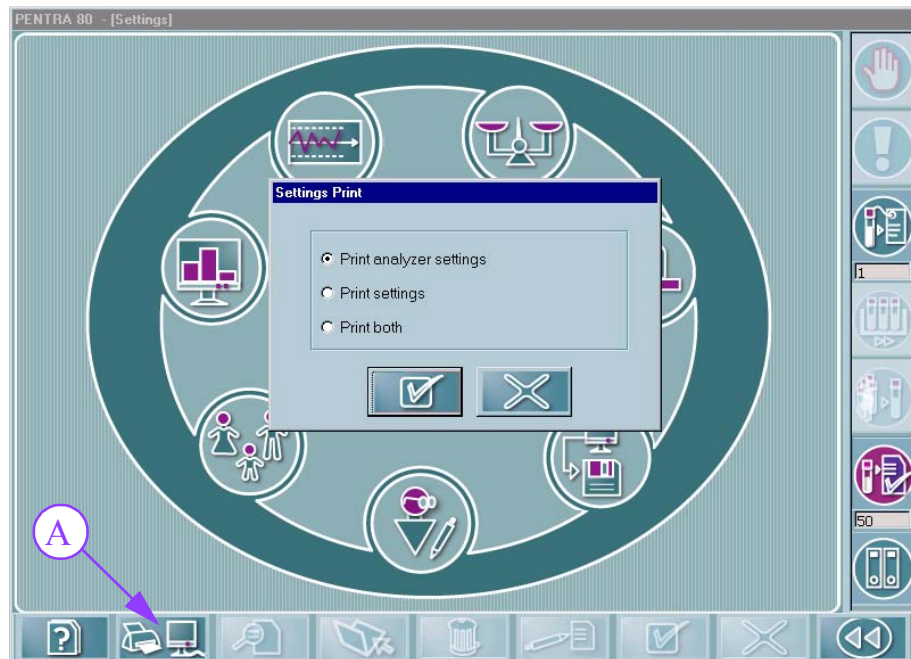
Diag.6 Save restore settings screen



### 3. Print

Enter: **Menu / Settings**

Press the Print/Send button (A), the following window appears (See Diag.7 “Settings print window”, page 4).



Diag.7 Settings print window

Select an option then press the «Validate» button.

#### 3.1. Print analyzer settings

This option allows to print:

- Mechanical Systems \ Technical adjustment parameters
- Pulse Adjustment parameters
- Daily workload parameters
- Quality assurance parameters

#### 3.2. Print settings

This option allows to print:

- The analyzer identification
- The Reagents configuration
- Quality assurance configuration and parameters
- The printer settings
- The cycle options
- The communication configuration
- The type parametrings

#### 3.3. Print both

Allow to print the two previous options



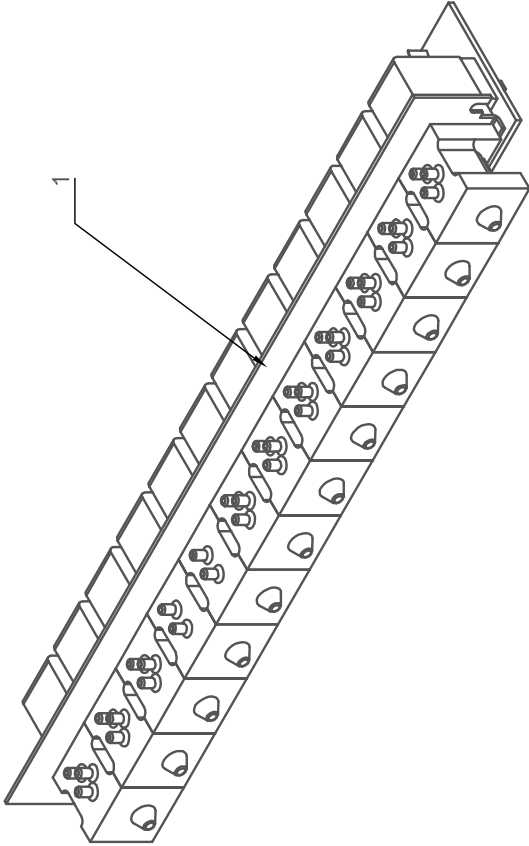
---

## Exploded views

---


1. Valve 1 to 12.....	8-3
2. Valves 13 to 19 .....	8-4
3. Valves 20 to 23 .....	8-5
4. Valves 24 to 30 .....	8-6
5. Valves 31 to 35 .....	8-7
6. Reagents syringe assy .....	8-8
7. Syringe, Reagent assy .....	8-9
8. Needle, Rinse block .....	8-10
9. Needle, Sampling needle.....	8-11
10. Syringe, optical bench.....	8-12
11. Sampling syringe assy.....	8-13
12. Draining\Counting syringe piston.....	8-14
13. Draining syringe assy.....	8-15
14. Counting syringe body .....	8-16
15. Counting syringe assy.....	8-17
16. Draining syringe assy.....	8-18
17. Diluent tank assy.....	8-19
18. Optical bench lamp & silent blocks.....	8-20
19. PCB, LED board for cover.....	8-21
20. Chamber assy .....	8-22
21. Chamber, 5 chambers block.....	8-23
22. Counting head.....	8-24

23. 5DIFF syringe motor assy.....	8-25
24. LMNE flowcell .....	8-26
25. Reagent heating coil .....	8-27
26. Chambers assy .....	8-28
27. Sampling percutor motor .....	8-29
28. Tube holder assy .....	8-30
29. Tube holder assy .....	8-31
30. Carriage belts .....	8-32
31. Mixer assy .....	8-33
32. Mixer: motor and sensor.....	8-34
33. Loading tray lockers assy .....	8-35
34. Loader assy .....	8-36
35. Wheels and transfer mechanism .....	8-37
36. Front covers magnets.....	8-38
37. Ejector tray assy.....	8-39
38. Electronic boards.....	8-40
39. Recuperation trays.....	8-41
40. Internal computer.....	8-42
41. Reagent straw Diam. 28mm .....	8-43
42. Rack stickers .....	8-44

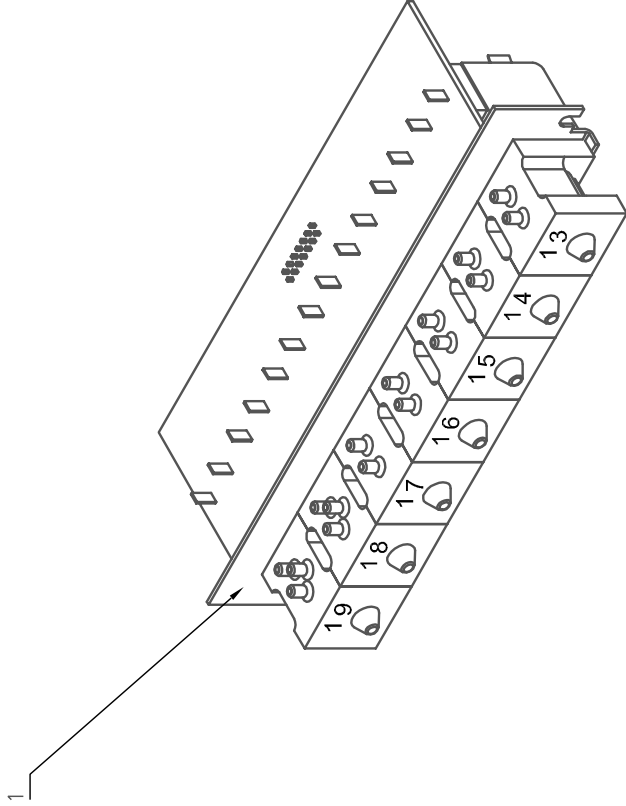


VALVE, LIQ. 2 WAYS/NC W/O COIL : XDA481B  
VALVE, LIQ. 3 WAYS W/O COIL : XDA483B

INDEX	PART NUMBER	DESIGNATION
1	XDA751C	VALVE, LIQ 12 VALVES (1-12)

			DESIGNATION : VALVE, LIQUID 12 VALVES ASSY (1-12)			
			DATE : 10/01/02	DIAG :	PAGE : 01	
			LML001			
			PENTRA 80			

Creation



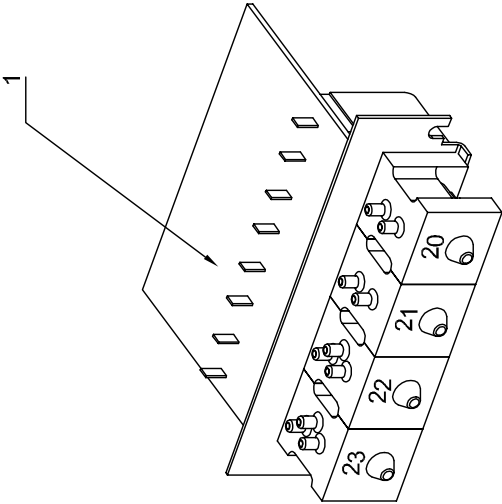
VALVE, LIQ. 2 WAYS/NC W/O COIL : XDA481B  
VALVE, LIQ. 3 WAYS W/O COIL : XDA483B

INDEX	PART NUMBER	DESIGNATION
1	XDA752C	VALVE, LIQ 7 VALVES (13-19)


DESIGNATION : VALVES, LIQUID 7 VALVES (13-19)		
DATE : 10/01/02	DIAG :	PAGE : 02
LML002	PENTRA 80	

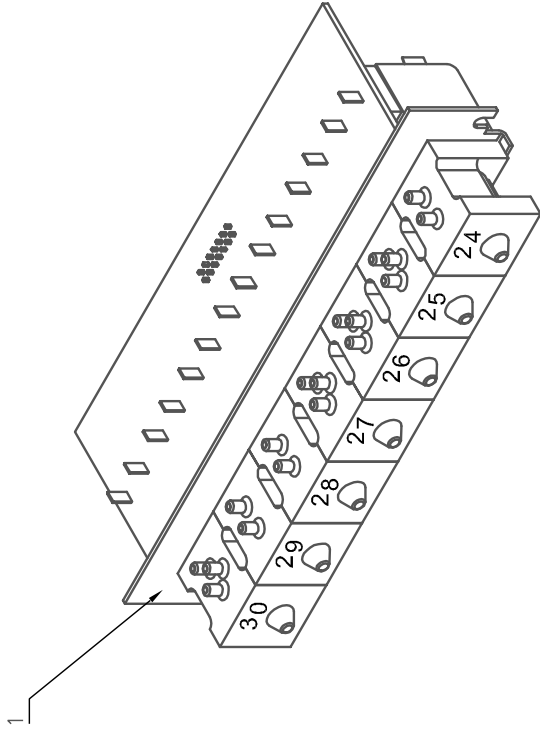


A	Creation
Ind	NOTE TECHNIQUE
MODIFICATIONS	



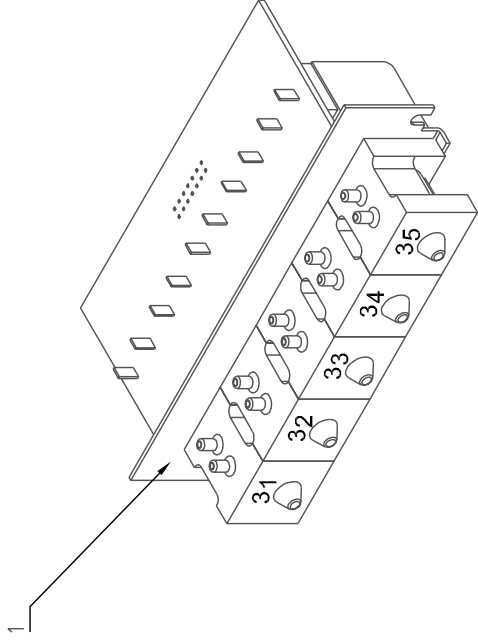
INDEX	PART NUMBER	DESIGNATION
1	XDA753C	VALVE, LIQ 4 (20-23)

A	Ind	NOTE TECHNIQUE	Creation	MODIFICATIONS	DESIGNATION :  VALVE, LIQUID 4 VALVES (20-23)			
						DATE : 10/01/02	DIAG :	PAGE : 03
						LML003  PENTRA 80		




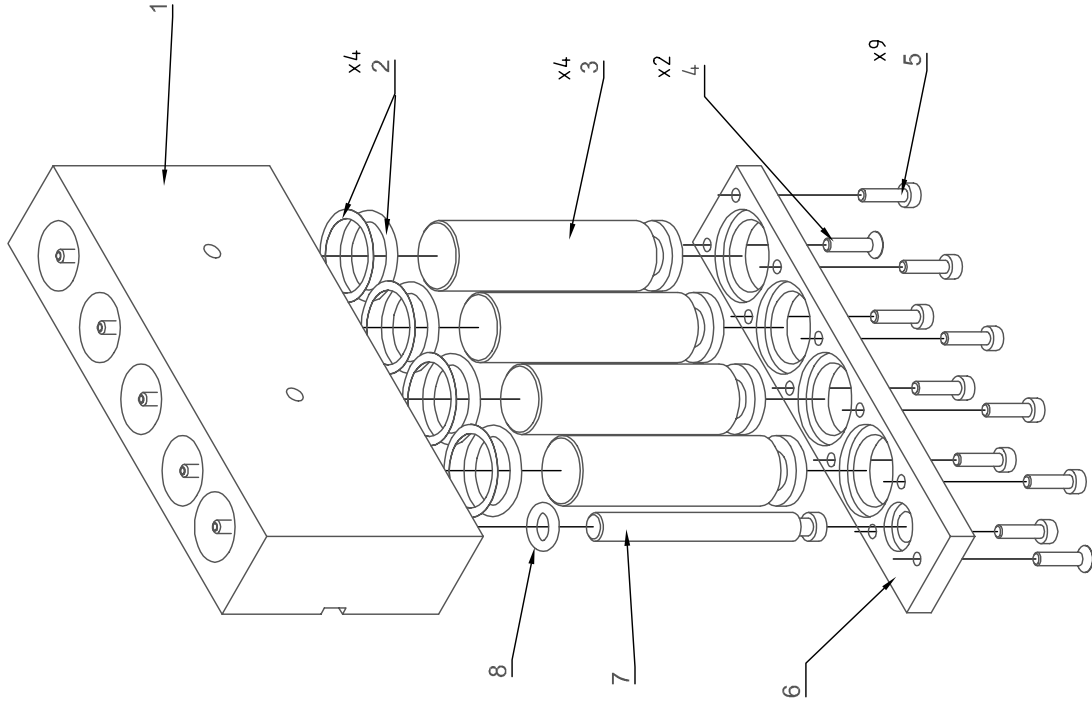
INDEX	PART NUMBER	DESIGNATION
1	XDA754C	VALVE, LIQ 7 (24-30)

				DESIGNATION :		VALVE, LIQUID 7 VALVES (24-30)					
				DATE : 10/01/02		DIAG :				PAGE : 04	
A				Creation							
		NOTE TECHNIQUE				MODIFICATIONS		LML004			
								PENTRA 80			



INDEX	PART NUMBER	DESIGNATION
1	XDA755C	VALVE, LIQ 5 VALVE (31-35)

DESIGNATION : VALVE, LIQUID 5 VALVE (31-35)			
DATE : 10/01/02	DIAG :	PAGE : 05	
LML005	PENTRA 80		
A	NOTE TECHNIQUE	Creation	MODIFICATIONS

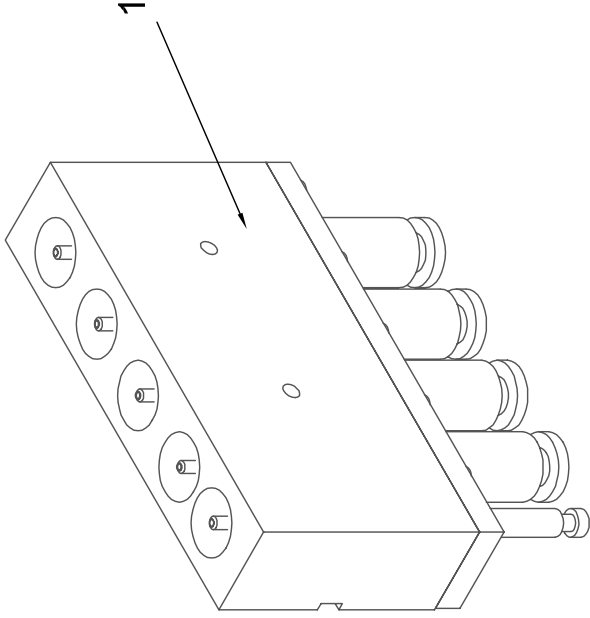


INDEX	PART NUMBER	DESIGNATION
1	GBG033A	SYRING, REAG BLOCK BODY P60/80
2	XDA622A	O'RING, REAGENT SYR. + WASHER
3	GBC030A	SYRINGE, REAG PISTON P60/80
4		SCREW FX M3 x 12
5		SCREW CHC M3 x 12
6		REAGENTS SYRINGE TOP
7	GBC031A	SYRINGE, LYSE PISTON MIC/P60/80
8	FAA065A	O'RING, REAGENT SYRINGE D= 6.3


DESIGNATION : REAGENTS SYRINGE ASSY		LML006		PENTRA 80	
DATE : 14/01/02		DIAG :		PAGE : 06	
A		Creation		MODIFICATIONS	
Ind		NOTE TECHNIQUE			

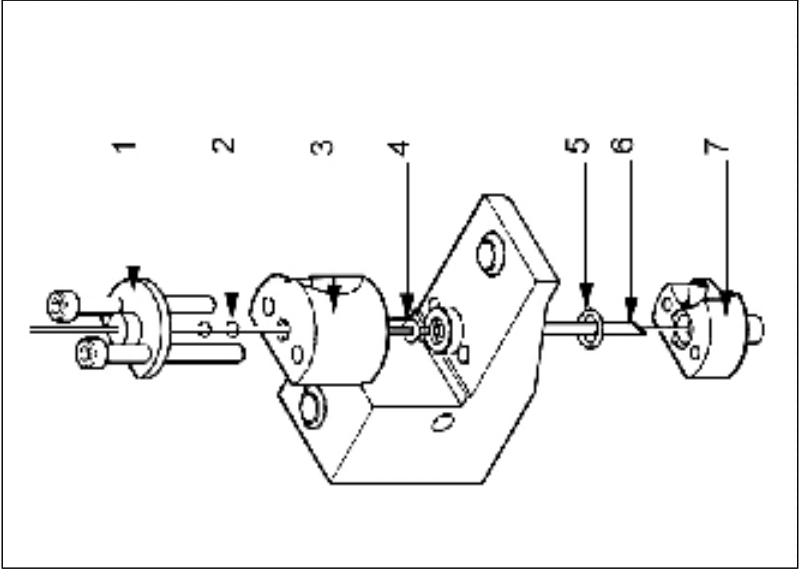







INDEX	PART NUMBER	DESIGNATION
1	XDA592AS	SYRINGE, REAGENT ASSY P80

				DESIGNATION :		SYRINGE, REAGENT ASSY P60		
				DATE : 14/01/02		DIAG :	PAGE : 07	
				LML007			PENTRA 80	
A		Creation		MODIFICATIONS				
Ind	NOTE TECHNIQUE							




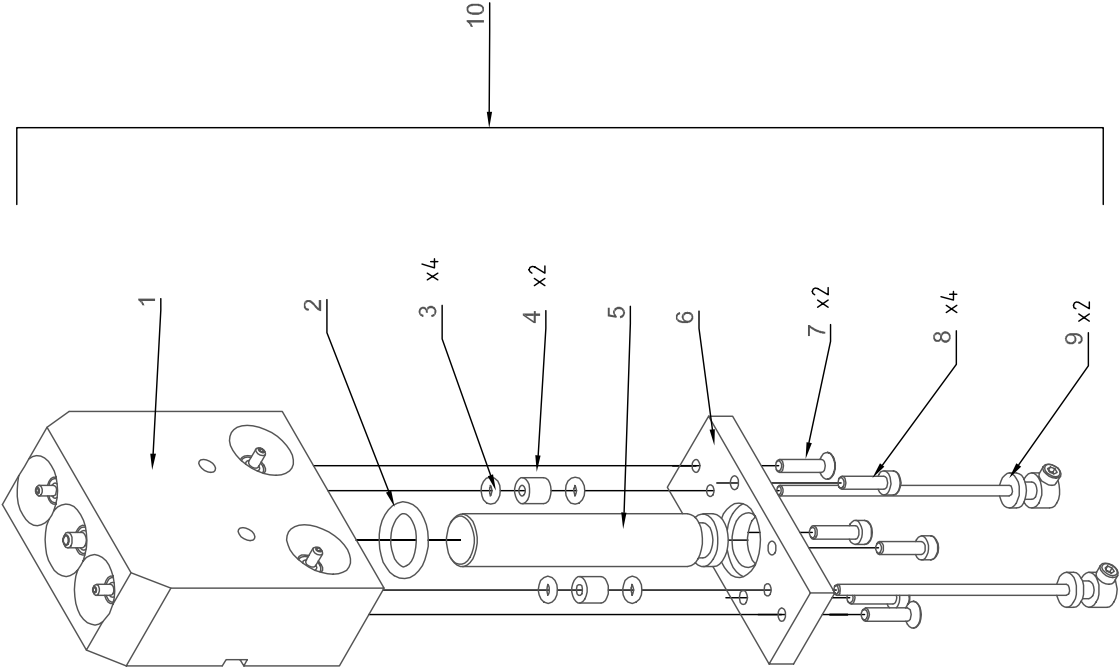
INDEX	PART NUMBER	DESIGNATION
1	GBG170A	NEEDLE GUIDE P60C+/P80
2	FAA054A	O'RING SAMPL. NEEDLE MIC CT/C+
3	GBG168A	NEEDLE, RINSING BLOCK P60C+/P80
4	FAA013A	O'RING NEEDLE RINSE BLOCK C+/80
5	FAA057A	O'RING, PIERCING NEEDLE P120/C+/P80
6	GBG166A	NEEDLE, PIERC. RINSE BLOC P60C+/P80
7	GBG169A	NEEDLE, PIERCING P60C+/P80

A Ind	NOTE TECHNIQUE	MODIFICATIONS	DESIGNATION : NEEDLE, RINSE BLOCK P60 C+			
			DATE : 14/01/02			
			DIAG :		PAGE : 08	
			LML008			
			PENTRA 80			
						



INDEX	PART NUMBER	DESIGNATION
1	XDA655AS	NEEDLE, SAMPLING NEEDLE P60/80

DESIGNATION : NEEDLE, SAMPLING NEEDLE P60/80			
DATE : 14/01/02	DIAG :	PAGE : 09	
LML009		PENTRA 80	
Creation		MODIFICATIONS	
A	NOTE TECHNIQUE		
Ind			



INDEX	PART NUMBER	DESIGNATION
1	GBG037A	SYRINGE, 5DIFF BLOCK BODY P60/80
2	FAA040A	O'RING, 5 DIFF SYRING D=12.1
3	FAA067A	O'RING, 5 DIFF SYRING D=2.4
4	GBG042A	SYRINGE, CROSSPIECE P60/80
5	GBG040A	SYRINGE, 5 DIFF PISTON P60/80
6		SYRINGE TOP
7		SCREW FX M3 x 12
8		SCREW CHC M3 x 12
9	XDA616AS	NEEDLE,190µL 5.DIFF SYR. P60/80
10	XDA591AS	SYRINGE, 5 DIFF ASSY P60/80

DESIGNATION :

SYRINGE, OPTICAL BENCH P60

DATE : 15/01/02

DIAG :

PAGE : 10

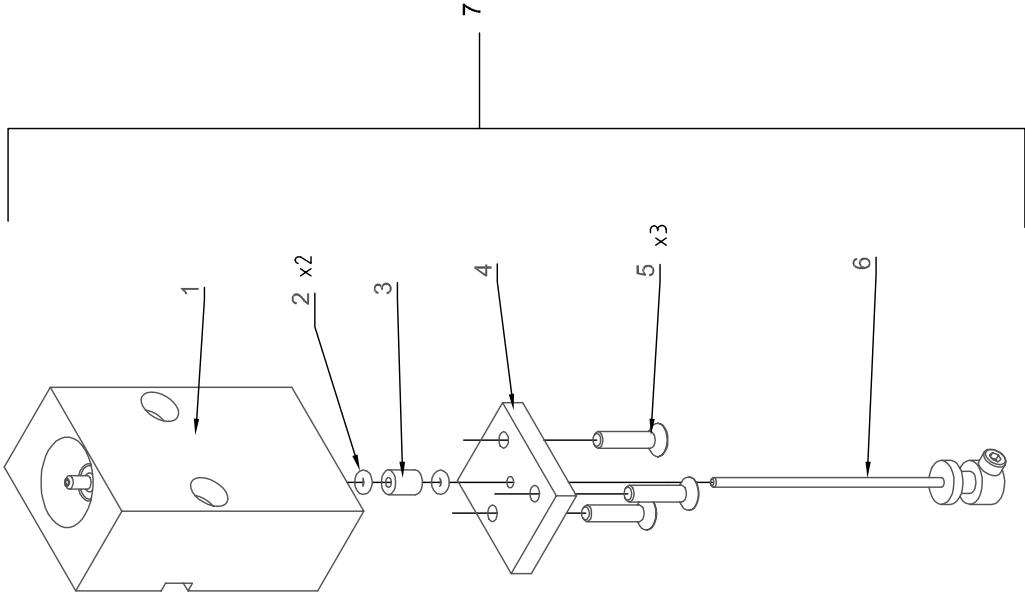
LML010

MODIFICATIONS


Creation:

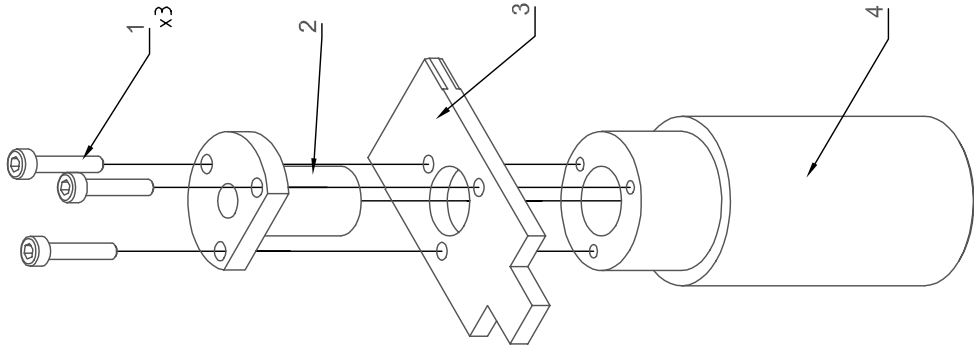
NOTE TECHNIQUE





INDEX	PART NUMBER	DESIGNATION
1	GBG044A	SYRINGE, SAMP. SYR. BODY P60/80
2	FAA064A	O'RING, SAMPLING SYR. P60/80
3	GBG048A	SYRINGE, SAMPLING CROSSPIECE
4		SAMPLING, SYRINGE TOP
5		SCREW FX M3 x 12
6	XDA617AS	NEEDLE, 100µL SAMP. SYR. P60/80
7	XDA593AS	SYRINGE, SAMPLING ASSY P60

				DESIGNATION :		SAMPLING SYRINGE ASSY		
				DATE : 15/01/02		DIAG :	PAGE : 11	
				LML011		PENTRA 80		
				MODIFICATIONS				
A	Creation							
Ind	NOTE TECHNIQUE							



INDEX	PART NUMBER	DESIGNATION
1		SCREW CHC M3 x 16
2		SYRINGE NUT P = 6.35
3		VACUUM, SYRINGE GUIDE PLATE
4	GBG052A	SYRINGE, VAC/WASTE PISTON P60/80

DESIGNATION :      SYRINGE, VAC / WASTE PISTON  
P60/80



DATE : 15/01/02      DIAG :      PAGE : 12

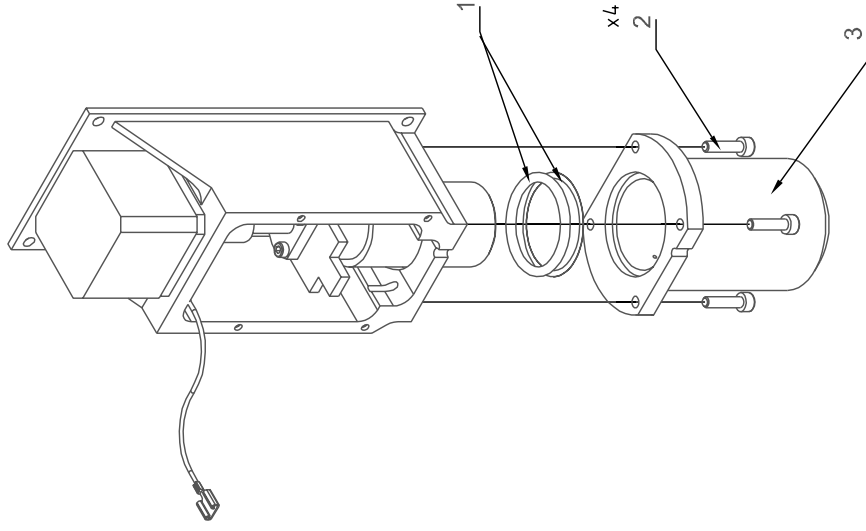
LML012

PENTRA 80


Creation

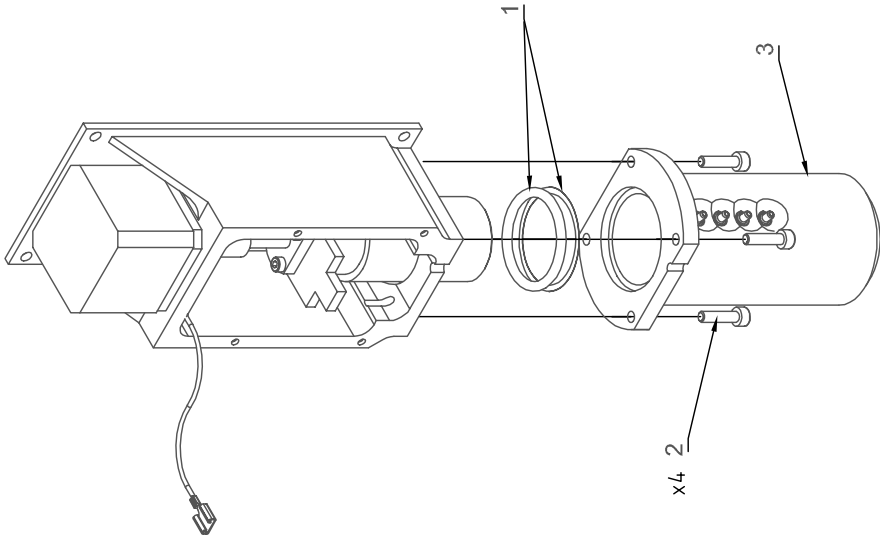
NOTE TECHNIQUE

MODIFICATIONS



INDEX	PART NUMBER	DESIGNATION
1	XDA621A	O'RING, VAC/WASTE PUMP + WASHER
2		SCREW CHC M4 x 16
3	GBG212A	SYRINGE, WASTE PUMP BODY P60/80

A	Ind	NOTE TECHNIQUE	Creation	MODIFICATIONS	DESIGNATION : SYRINGE, WASTE COMPLETE P60/80	DATE : 16/01/02	DIAG :	PAGE : 13	LML013	PENTRA 80	



INDEX	PART NUMBER	DESIGNATION
1	XDA621A	O'RING, VACWASTE PUMP + WASHER
2		
3	GBG211A	SYRINGE, VACUUM PUMP BODY P60/80

DESIGNATION :

SYRINGE, VAC COMPLETE BODY

DATE : 16/01/02

DIAG :

PAGE : 14

LML014

MODIFICATIONS

Creation

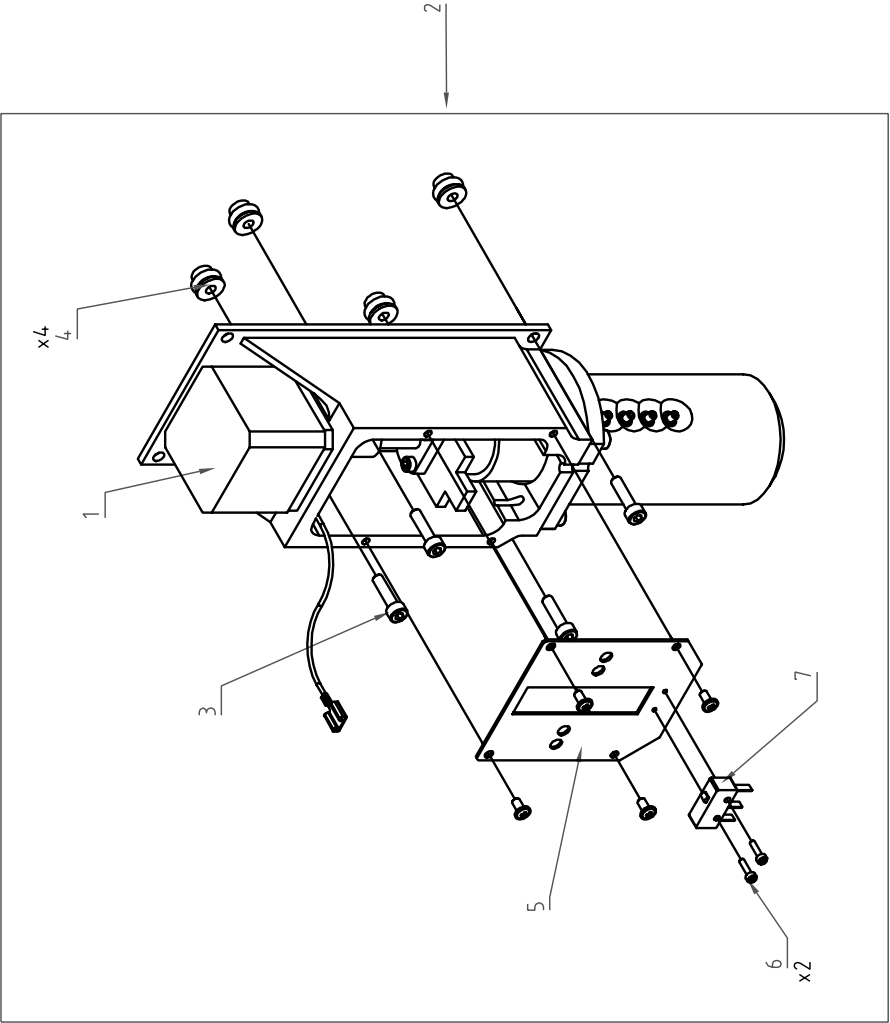
NOTE TECHNIQUE

A

Ind





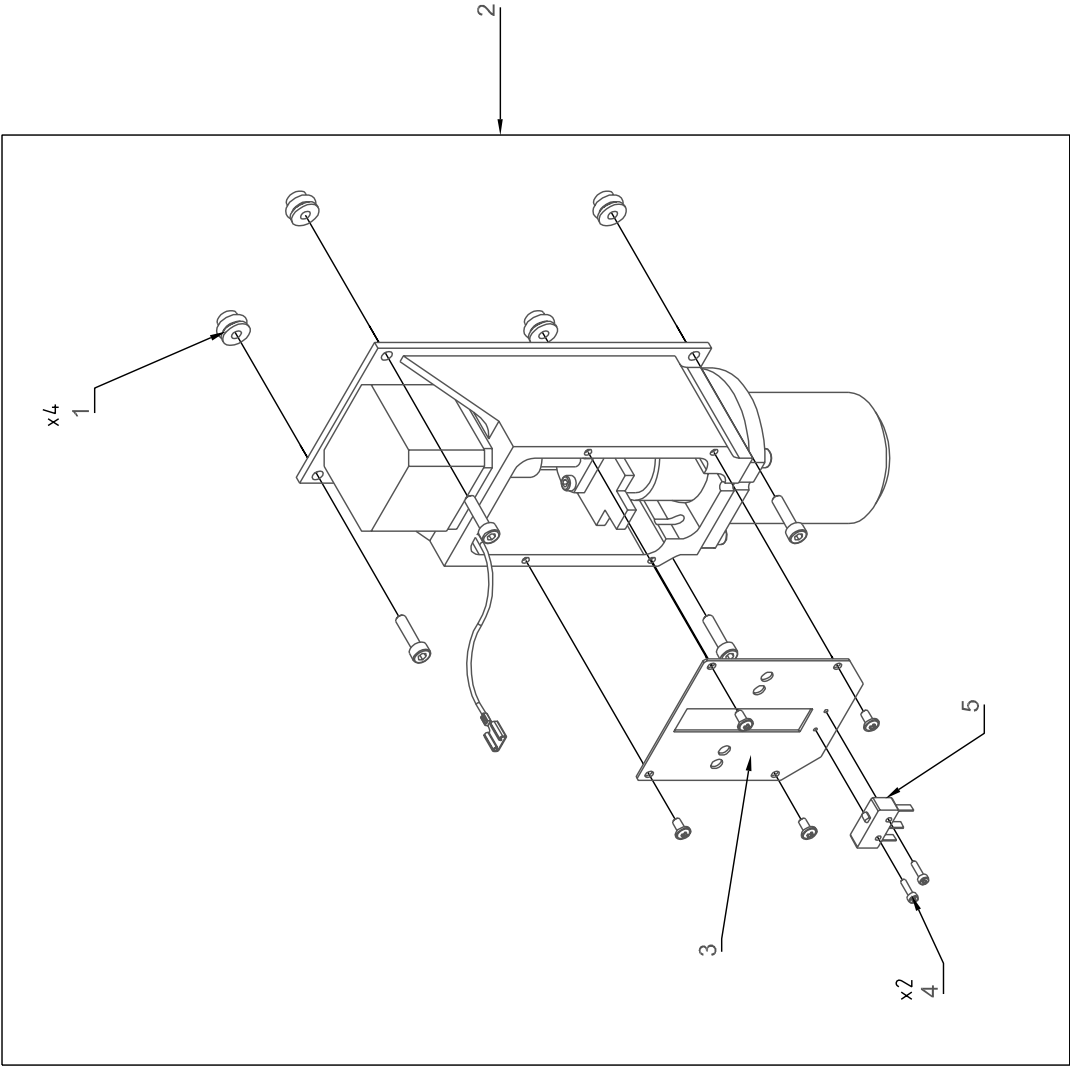


INDEX	PART NUMBER	DESIGNATION
1		SYRINGE BLOCK
2	XDA749A	SYRINGE, VAC. COMPLETE P80
3		VACUUM, SYRINGE GUIDE PLATE
4	FAL009A	SILENT BLOC, FOR SUB ASSEMBLIES
5		MOTOR, MICROSWITCH PLATE
6		SCREW CHC M2 x 8
7	CAE010A	SWITCH, MICROSWITCH XC5-81

DESIGNATION : SYRINGE, VAC. COMPLETE P80		
DATE : 16/01/02	DIAG :	PAGE : 15
LML015	PENTRA 80	



A	NOTE TECHNIQUE	Creation	MODIFICATIONS
Ind			

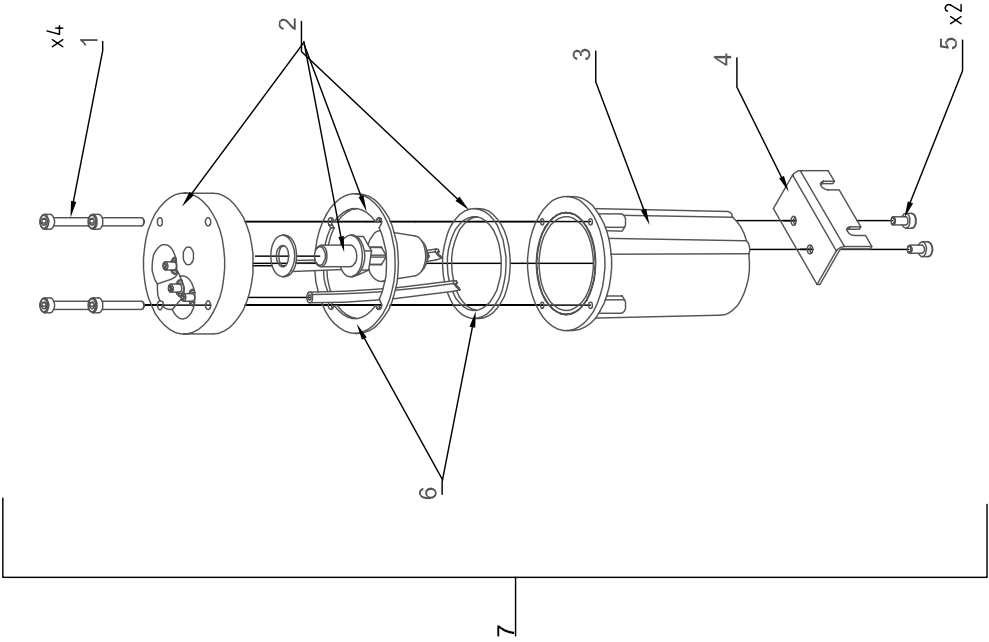


INDEX	PART NUMBER	DESIGNATION
1	FAL009A	SILENT BLOC, FOR SUB ASSEMBLIES
2	XDA748A	SYRINGE, WASTE COMPLETE P60
3		MOTOR, MICROSWITCH PLATE
4		SCREW CHC M2 x 8
5	CAE010A	SWITCH, MICROSWITCH XC5-81

DESIGNATION : SHORT WASTE SYRINGE ASSY		
DATE : 16/01/02	DIAG :	PAGE : 16
LML016 PENTRA 80		



A	Creation
Ind	NOTE TECHNIQUE
MODIFICATIONS	



INDEX	PART NUMBER	DESIGNATION
1		SCREW, CHC M3 x 20
2	XDA626AS	CHAMBER, DILUENT TANK COVER P60/80
3	GAL094A	CHAMBER, WAST. P120/DIL TANK P60/80
4		DILUENT CHAMBER BRACE
5		SCREW CHC M3 x 6
6	XEA286AS	KIT O'RING + WASHER P60/P80/P120
7	XDA605A	CHAMBER, DILUENT TANK ASSY P60/80

DESIGNATION :

DILUENT CHAMBER ASSY



DATE : 16/01/02

DIAG :

PAGE : 17

LML017

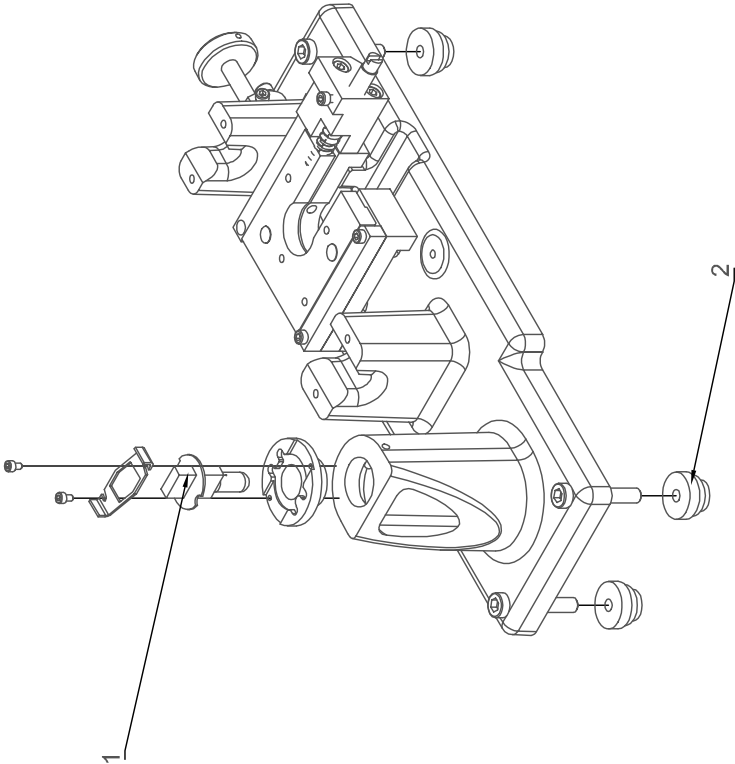
MODIFICATIONS

Creation


NOTE TECHNIQUE

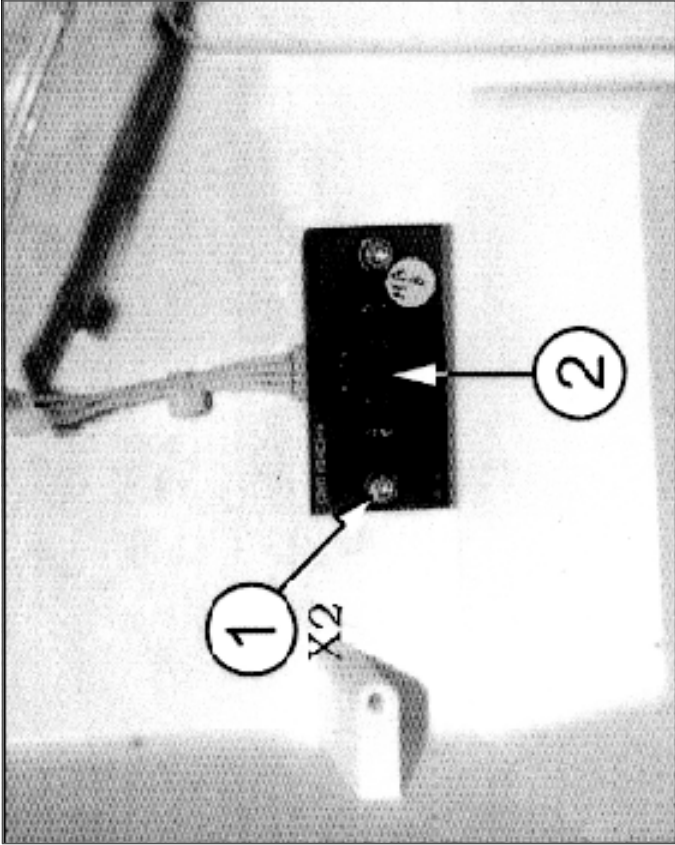
A

Ind



INDEX	PART NUMBER	DESIGNATION
1	DAJ007A	OPTICAL, LAMP FOR BENCH P60/80
2	FAL010A	SILENT BLOCK, OPTIC BENCH P60/80

		DESIGNATION : OPTICAL, LAMP + SILENT BLOCK OPTIC BENCH P60/80			
		DATE : 24/04/01		DIAG :	PAGE : 18
		LML018		PENTRA 80	
					

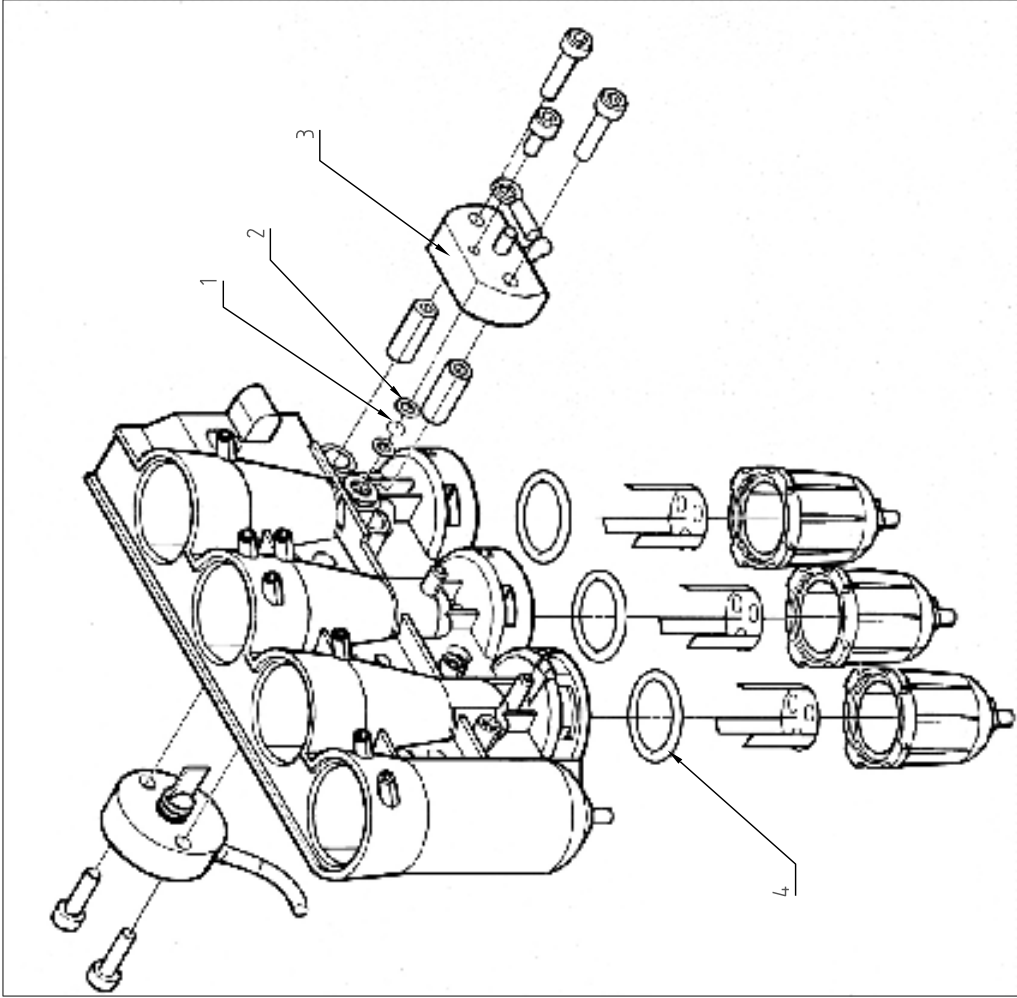


INDEX	PART NUMBER	DESIGNATION
1		AUTO-THREADED SCREW
2	XAA429AS	PCB, LED BOARD FOR COVER

DESIGNATION : PCB, LED BOARD FOR COVER			
DATE : 16/01/02	DIAG :	PAGE : 19	
LML019	PENTRA 80		



A	Creation	
Ind	NOTE TECHNIQUE	MODIFICATIONS

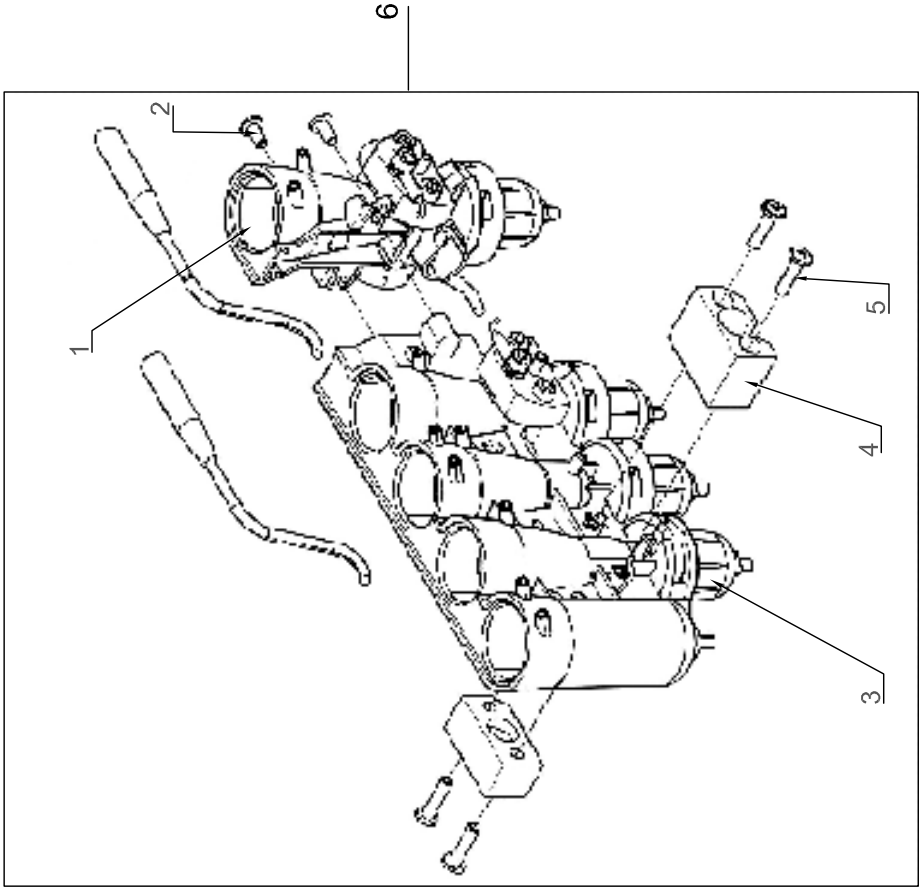


INDEX	PART NUMBER	DESIGNATION
1	FAK001A	CHAMBER, APERTURE 50µ
2	GBG156A	O'RING, APERTURE P60/M60/P80
3	GBG157A	CHAMBER, COUNTING HEAD P80
4	FAA066A	O'RING DRAINING CHAMBER P60/80

DESIGNATION :		PENTRA 80 CHAMBERS ASSY	
DATE	29/04/2002	DIAG :	PAGE : 20
LML049			PENTRA 80



A	NOTE TECHNIQUE	MODIFICATIONS
Ind		

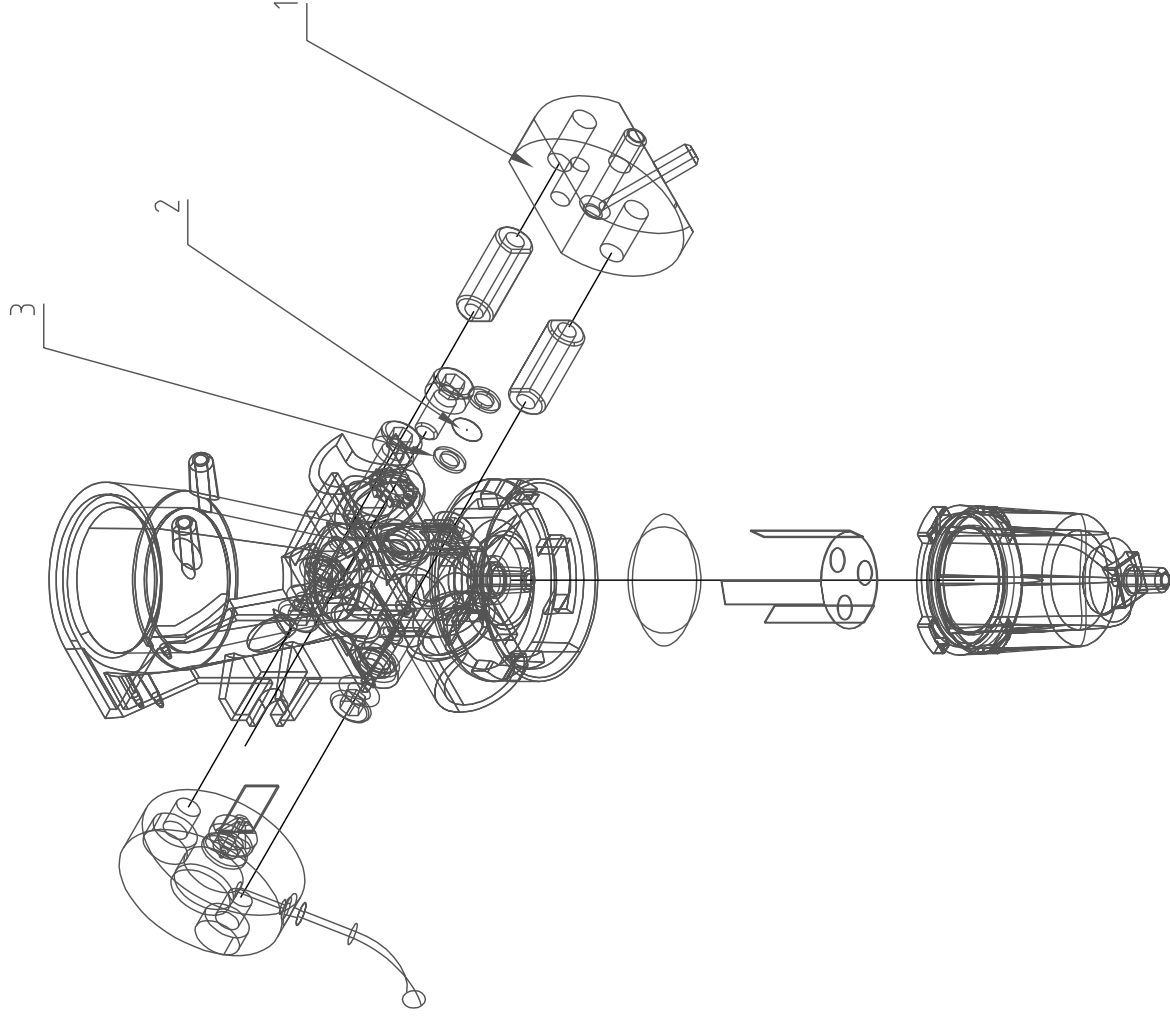


INDEX	PART NUMBER	DESIGNATION
1	XDA610B	CHAMBER, WBC/BASO CPTe P80/P60
2		AUTO-THREADED SCREW
3	XDA602B	CHAMBER, 4 CHAMBERS BLOCK P60/P80
4	XBA389A	PHOTOMETER, HB CPTe P60/80
5		AUTO-THREADED SCREW
6	XDA657B	CHAMBER, 5 CHAMBERS BLOC P60/80

DESIGNATION : CHAMBER, 5 CHAMBERS BLOCK P60/80		
DATE : 16/01/02	DIAG :	PAGE : 21
LML020		PENTRA 80



A	Creation
Ind	NOTE TECHNIQUE
MODIFICATIONS	



INDEX	PART NUMBER	DESIGNATION
1	GBG157A	CHAMBER, COUNTING HEAD P60/80
2	FAK003A	CHAMBER, APERTURE 80µ
3	GBG156A	O'RING, APERTURE P60/M60/P80

DESIGNATION :

CHAMBER, COUNTING HEAD P80

DATE : 20/03/02

DIAG :

PAGE : 22

LML041

MODIFICATIONS

Creation

NOTE TECHNIQUE

A  
Ind






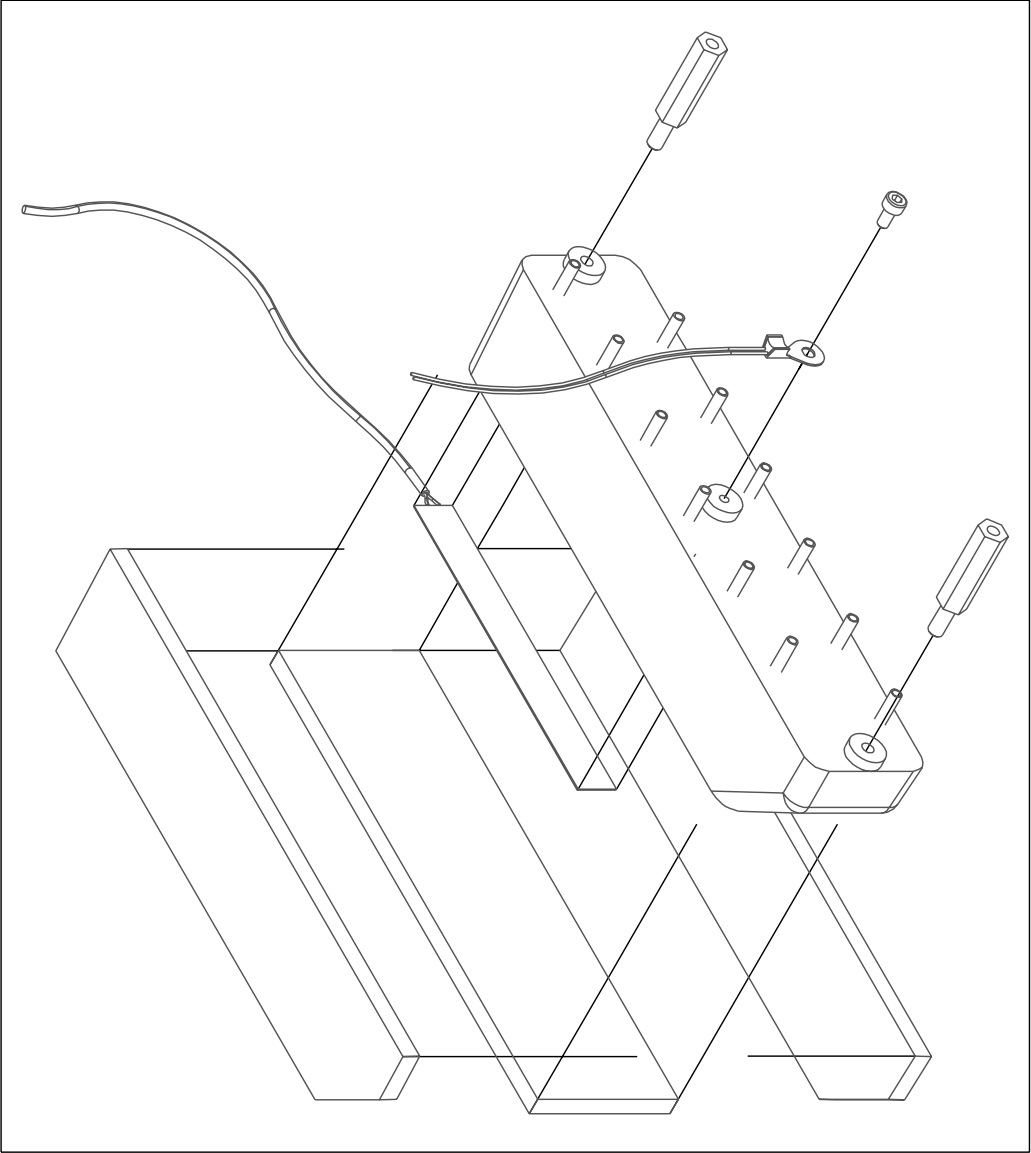




1

INDEX	PART NUMBER	DESIGNATION
1	XDA601BS	CHAMBER, LMNE FLOWCELL P60/80

				DESIGNATION : CHAMBER, LMNE FLOWCELL P60/80				
				DATE : 23/04/01		DIAG :	PAGE : 24	
				LML024 PENTRA 80				
				MODIFICATIONS				
A				Creation				
Ind	NOTE TECHNIQUE							

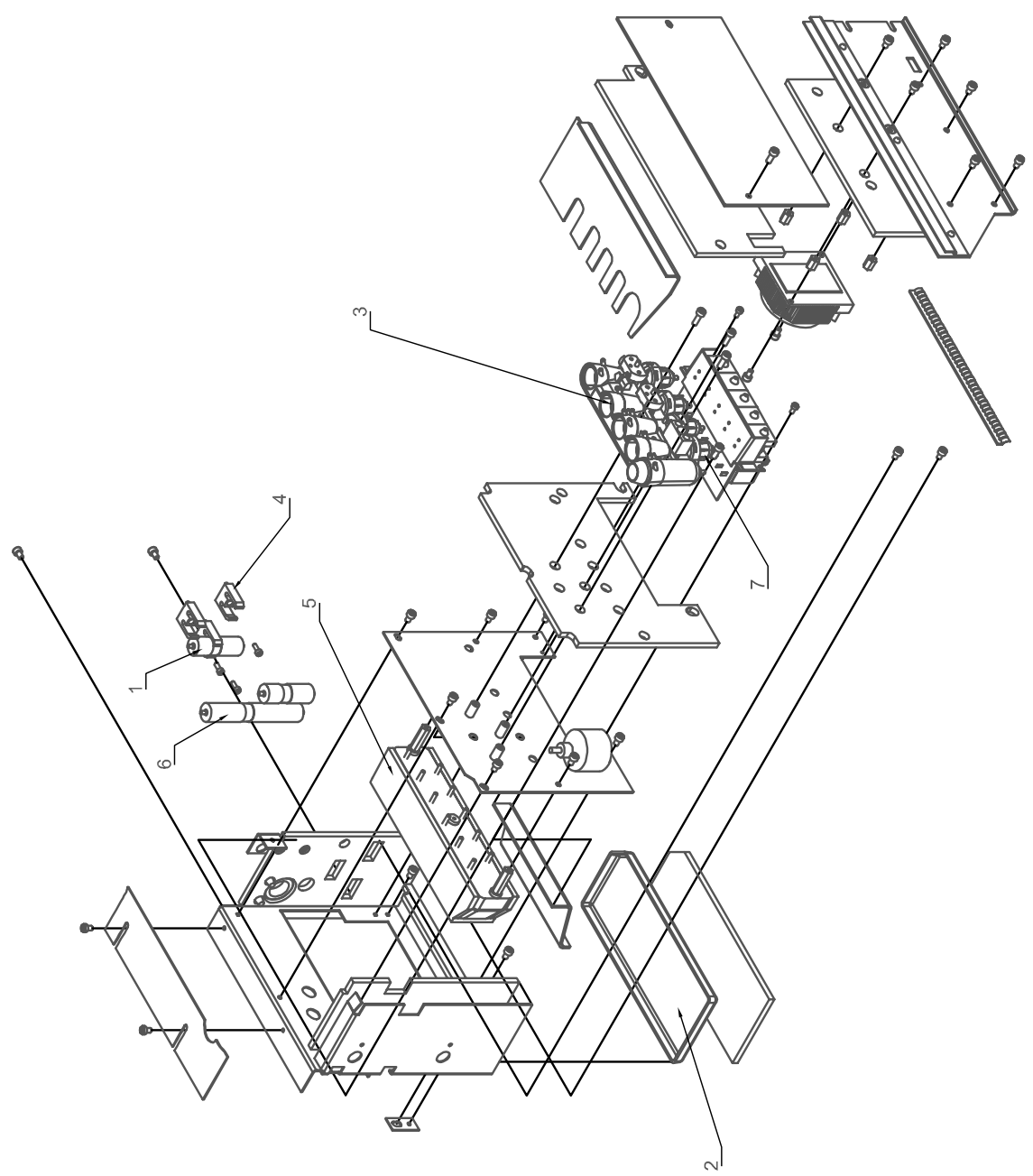


INDEX	PART NUMBER	DESIGNATION
1	XDA625AS	HEATER, BLOCK COMPLETE P60/P80


DESIGNATION : HEATER, BLOCK COMPLETE P60/P80		HEATER, BLOCK COMPLETE P60/P80	
DATE : 28/01/02	DIAG :	PAGE : 25	
LML029	PENTRA 80		

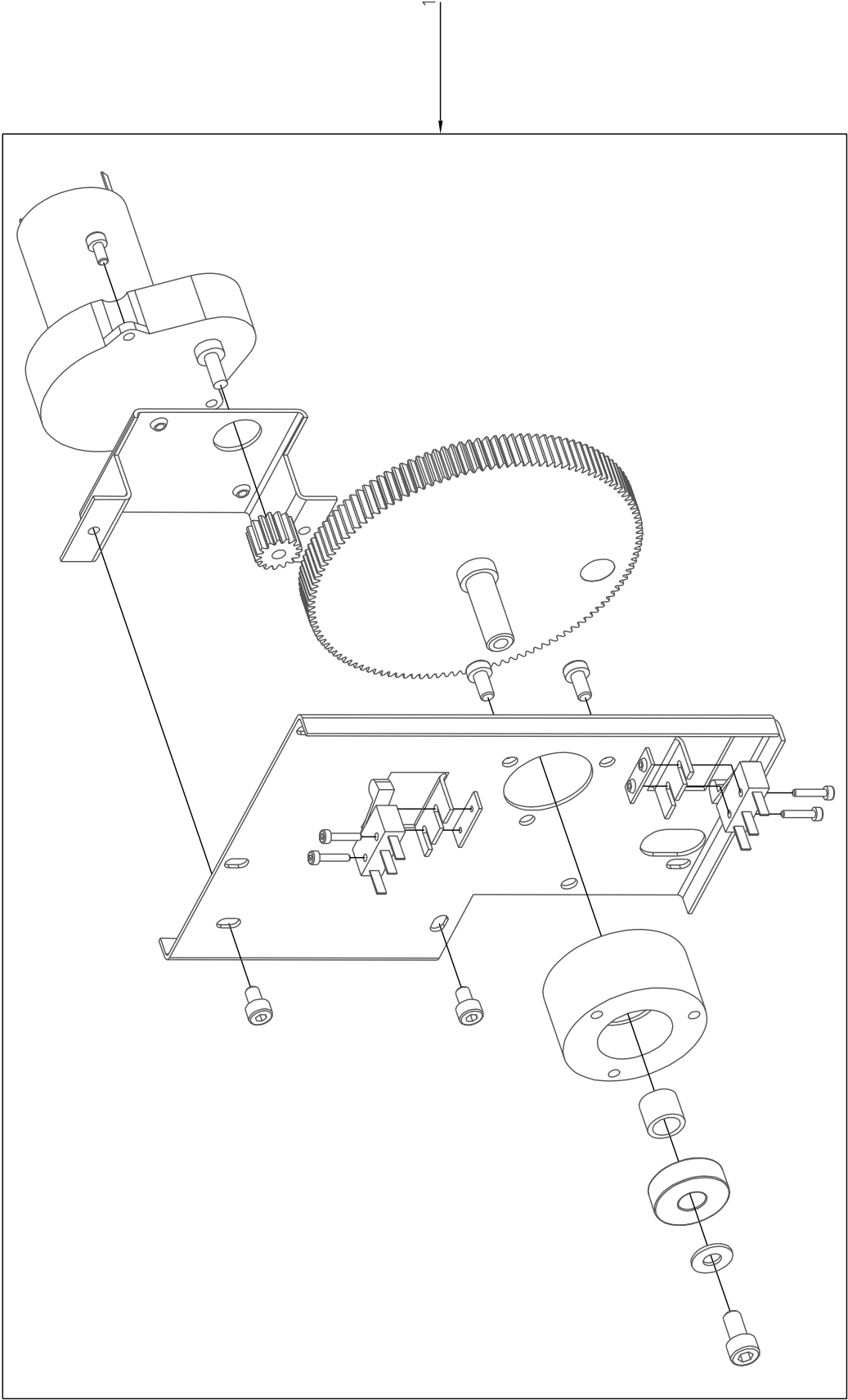


A	NOTE TECHNIQUE	Creation	MODIFICATIONS
Ind			



INDEX	PART NUMBER	DESIGNATION
1	XCA167A	CHAMBER, ISOLATOR (SMALL)
2	GBL0089	CUP, OVERFLOW T° ROOM P80
3	XDA657B	CHAMBERS, 5 CHAMBERS BLOCK
4	GBC015A	CLIP, MIX CH. HOLDER MIC/P120
5	XDA625AS	HEATER, BLOCK COMPL. P60/80
6	XCA166A	CHAMBER, ISOLATOR (LONG)
7	XCA191A	CHAMBER, ISOLATOR VENT. P80/C+

DESIGNATION : CHAMBERS ASSY P80			
A	Ind	Creation	
NOTE TECHNIQUE		MODIFICATIONS	
LML033		DATE : 14/01/02	PAGE : 26
		DIAG :	PENTRA 80

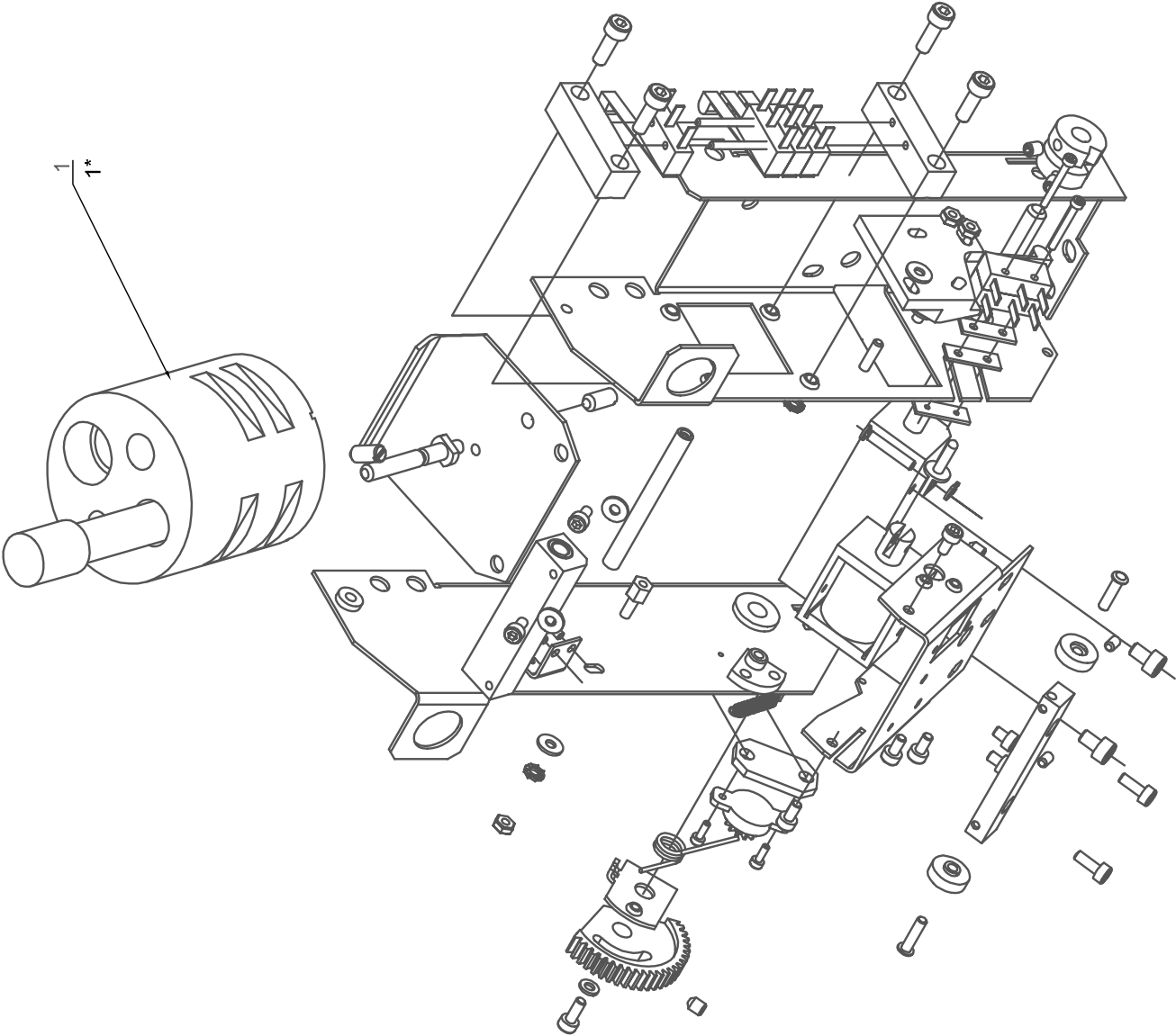


INDEX	PART NUMBER	DESIGNATION
1	XDA725A	MOTOR, SAMPLING MECHA. ASSY P80


DESIGNATION : MOTOR, SAMPLING MECHANISM ASSY P80/C+		
DATE : 29/01/02	DIAG :	PAGE : 27
LML034	PENTRA 80	

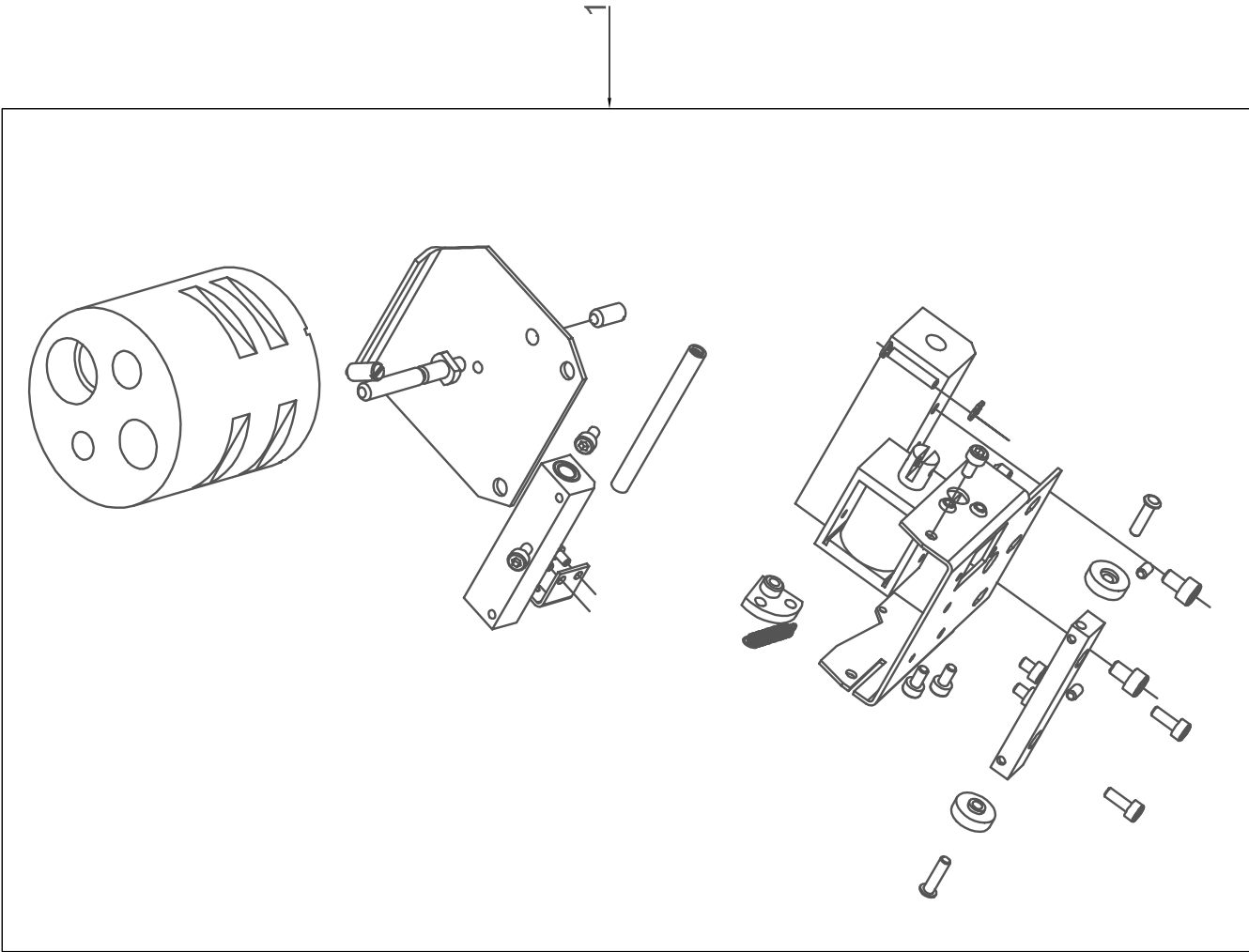


A	NOTE TECHNIQUE	Creation
Ind	MODIFICATIONS	




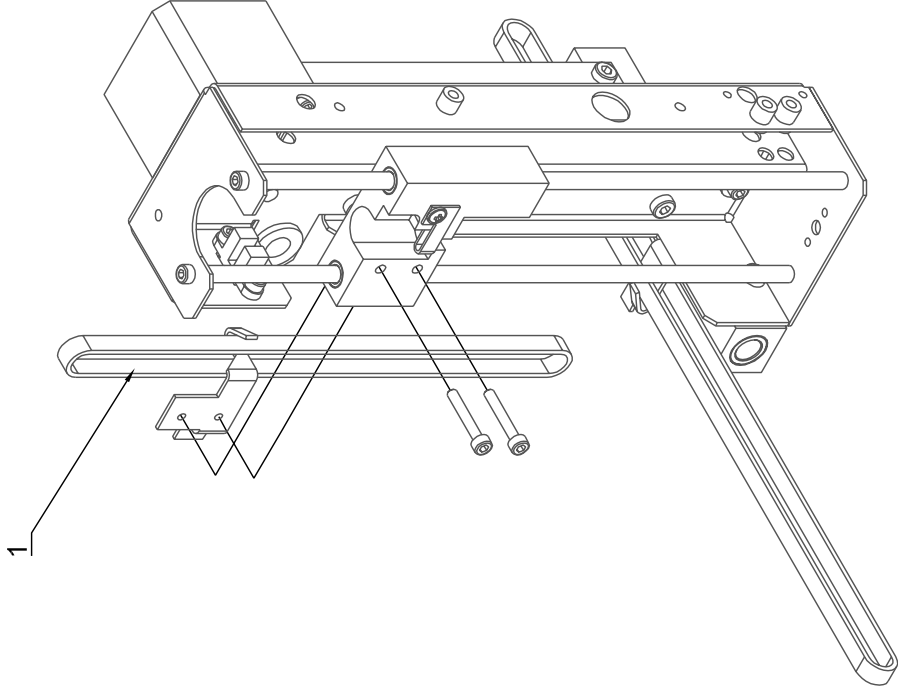
INDEX	PART NUMBER	DESIGNATION
1	GBL0183AS	SAMPLING, STD TUBE HOLDER P80
1*	GBL0254AS	SAMPLING, OPT TUBE HOLDER P80

DESIGNATION :		SAMPLING, TUBE HOLDER P80			
DATE : 14/01/02		DIAG :		PAGE : 28	
LML035		MODIFICATIONS		PENTRA 80	
A	NOTE TECHNIQUE	Creation			
Ind					




INDEX	PART NUMBER	DESIGNATION
1	XDA728A	SAMPLING, PIERCING BLOCK P80

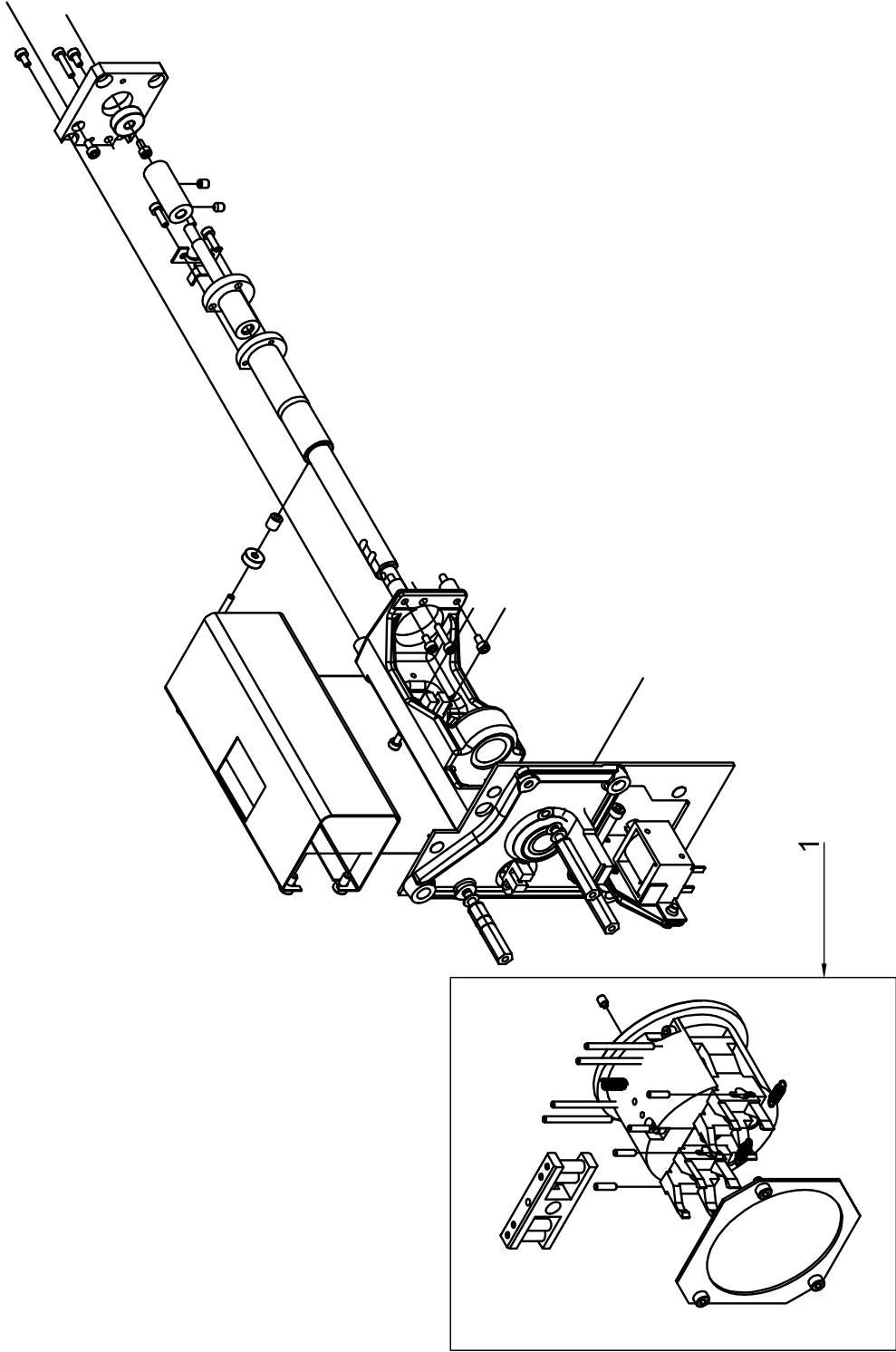
			DESIGNATION :		SAMPLING, PIERCING BLOCK P80		
			DATE : 14/01/02	DIAG :	PAGE : 29		
			LML035		PENTRA 80		
A		Creation					
Ind		NOTE TECHNIQUE	MODIFICATIONS				



INDEX	PART NUMBER	DESIGNATION
1	FBR011A	BELT, NEEDLE L= 364 P60/80

A	DESIGNATION : BELT PENTRA 80			
	DATE : 19/03/2002	DIAG :	PAGE : 30	
Ind	MODIFICATIONS			LML039 PENTRA 80



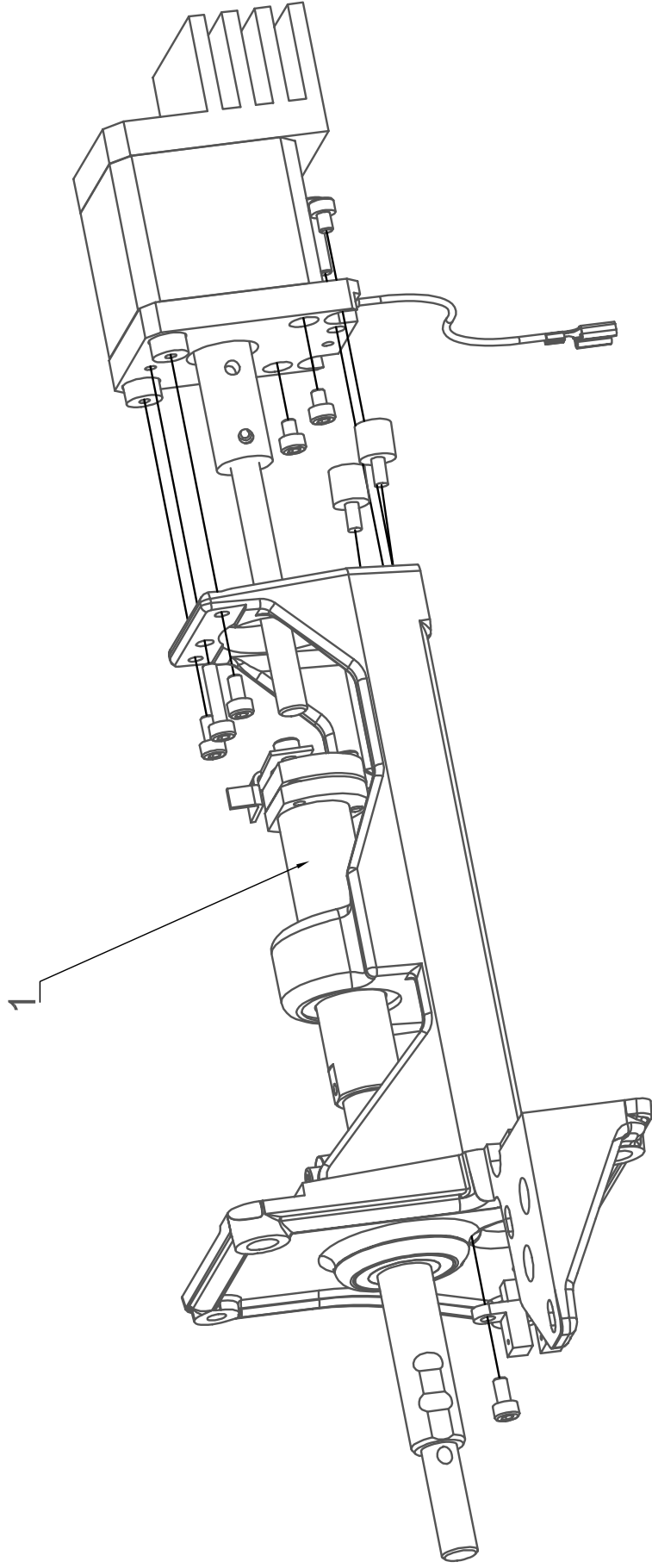


INDEX	PART NUMBER	DESIGNATION
1	XDA797AS	SAMPLING, GRABBER BLOC ASSY P80

DESIGNATION :    SAMPLING, GRABBER BLOC ASSY P80		
DATE : 28/01/02	DIAG :	PAGE : 31
LML028	PENTRA 80	



A	NOTE TECHNIQUE	Creation	MODIFICATIONS
Ind			



INDEX	PART NUMBER	DESIGNATION
1	XDA743A	MOTOR, MIXING COMPLETE P80

DESIGNATION :

MOTOR, MIXING COMPLETE P80

DATE : 23/01/02

DIAG :

PAGE : 32

LML022

PENTRA 80



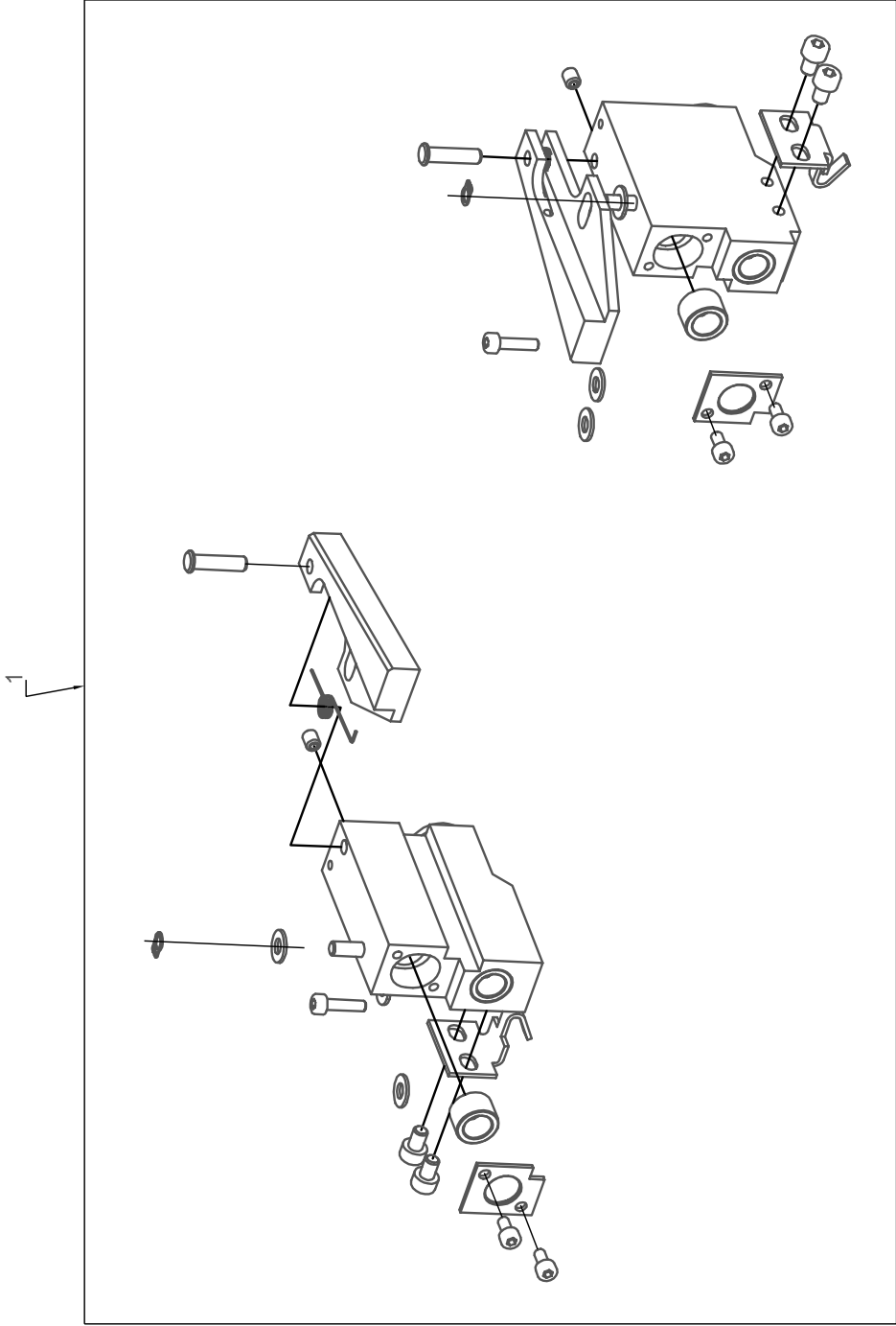
A

Ind

NOTE TECHNIQUE

Creation

MODIFICATIONS

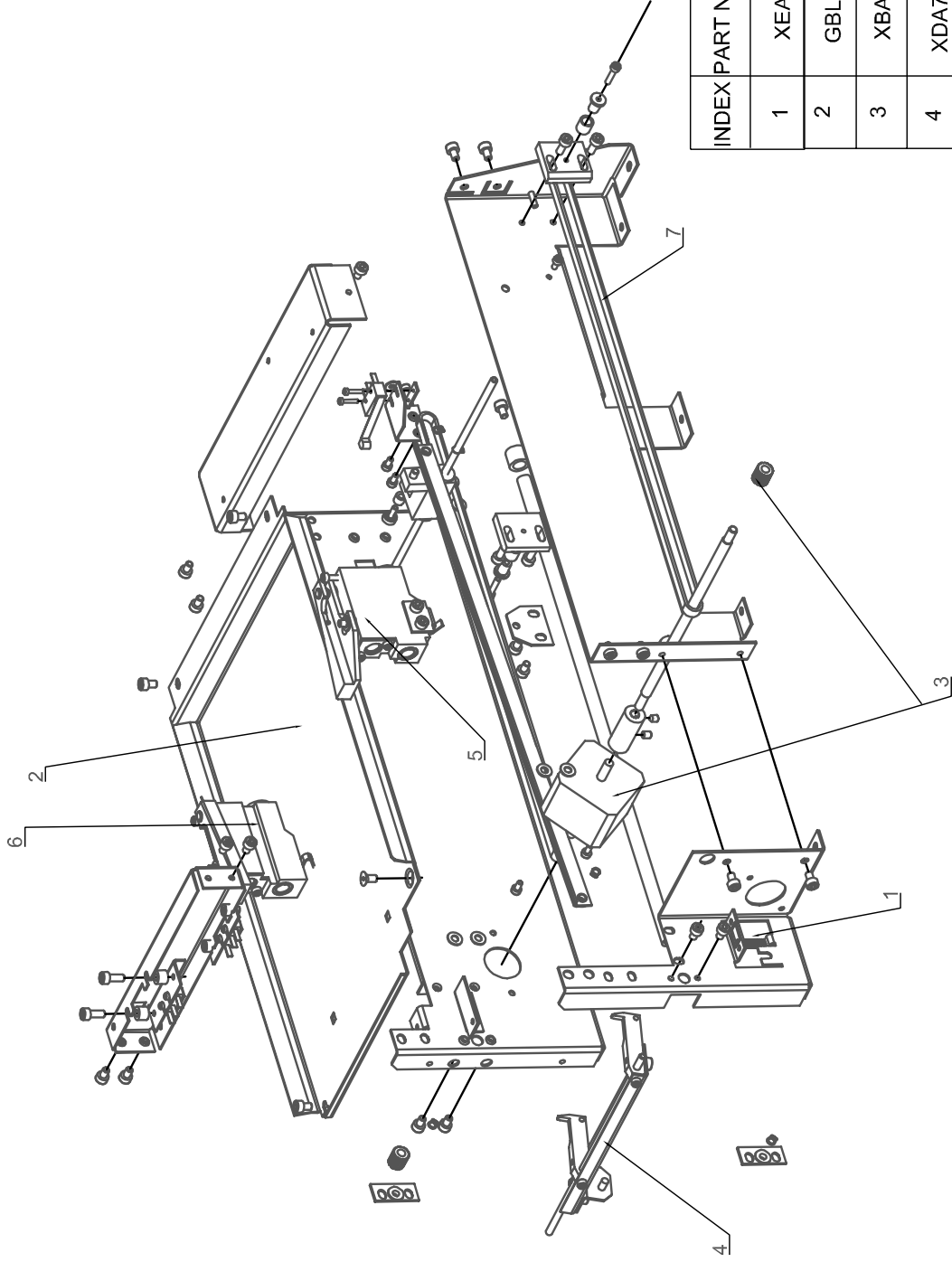


INDEX	PART NUMBER	DESIGNATION
1	XDA796AS	SAMPLING, RACK LOADING LOCK P80

DESIGNATION :    SAMPLING, RACK LOADING LOCK P80		
DATE : 25/01/02	DIAG :	PAGE : 33
LML027	PENTRA 80	



Creation		MODIFICATIONS
A	NOTE TECHNIQUE	

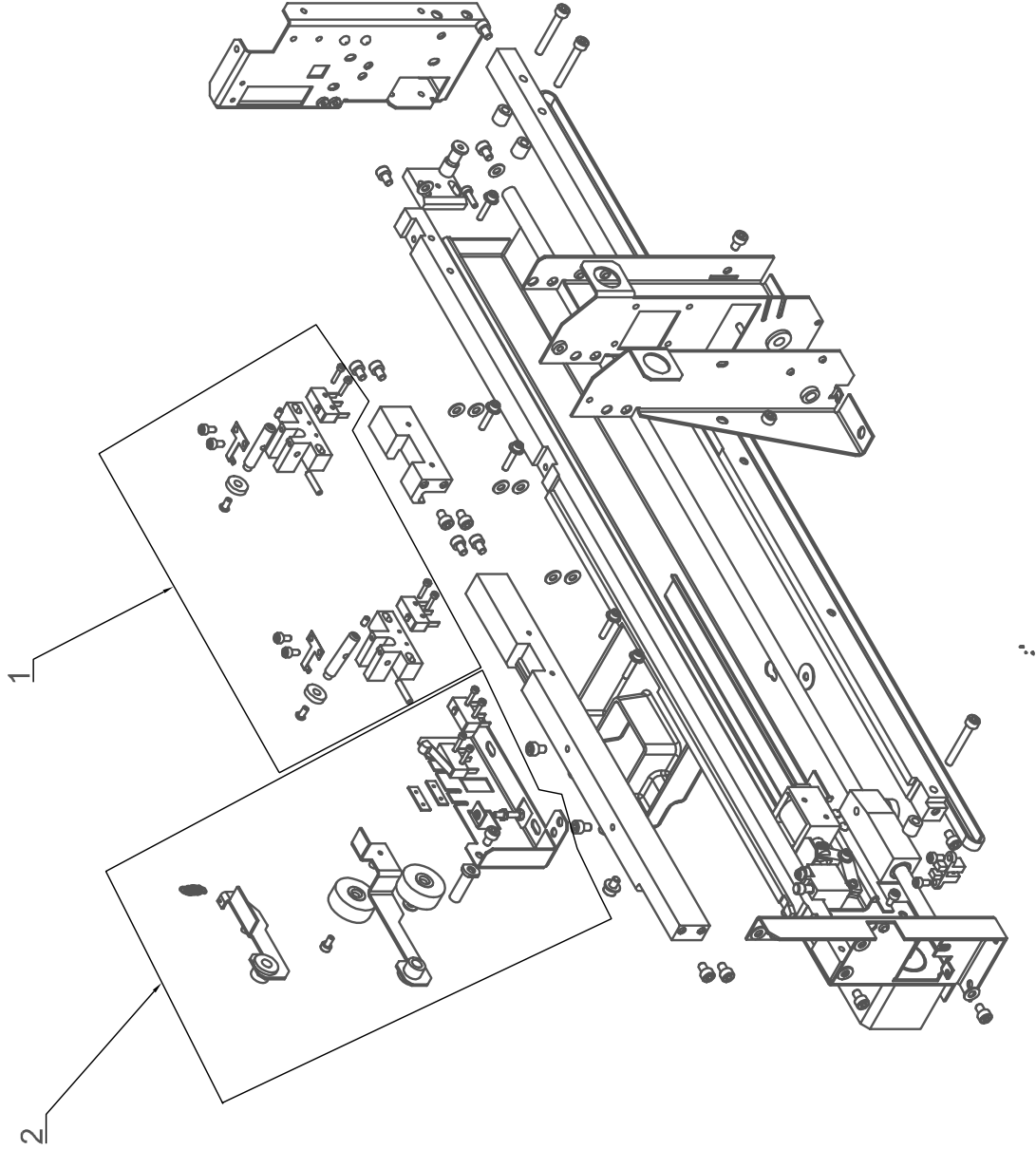


INDEX	PART NUMBER	DESIGNATION
1	XEA720AS	KIT RESSORT P80
2	GBL0042	CUP, RACK LOADING TRAY P80
3	XBA411A	MOTOR, PIERCINGMECHA P60C+/P80
4	XDA796AS	SAMPLING, RACK LOADING LOCK
5	XDA791AS	SAMPLING, RIGHT RACK LOADER
6	XDA792AS	SAMPLING, LEFT RACK LOADER
7	XDA793AS	BELT, RACK LOADING P80


DESIGNATION : ENS CHARGEMENT P80		
DATE : 28/01/02	DIAG :	PAGE : 34
LML030	PENTRA 80	

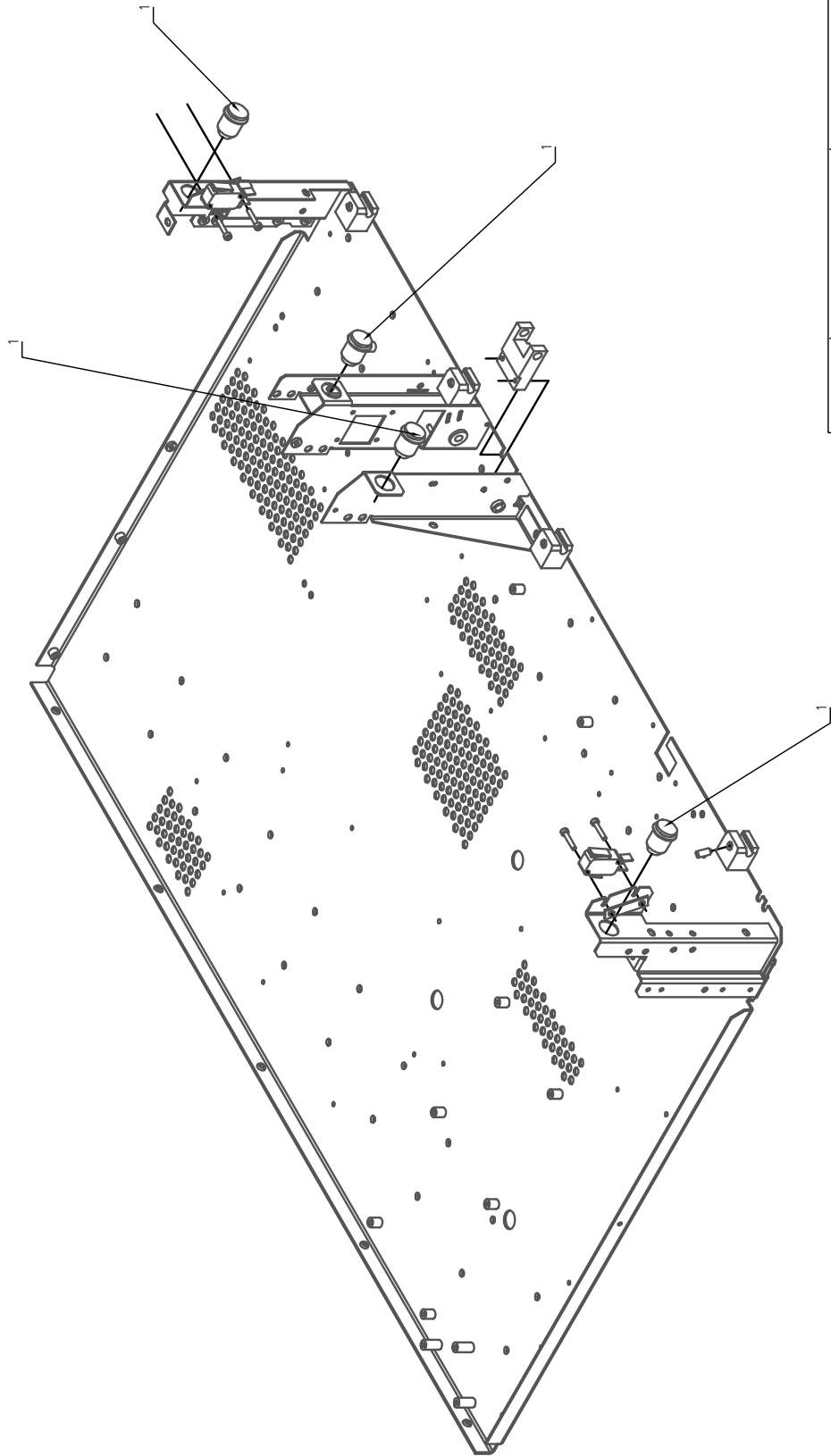


A	NOTE TECHNIQUE	Creation	MODIFICATIONS
Ind			



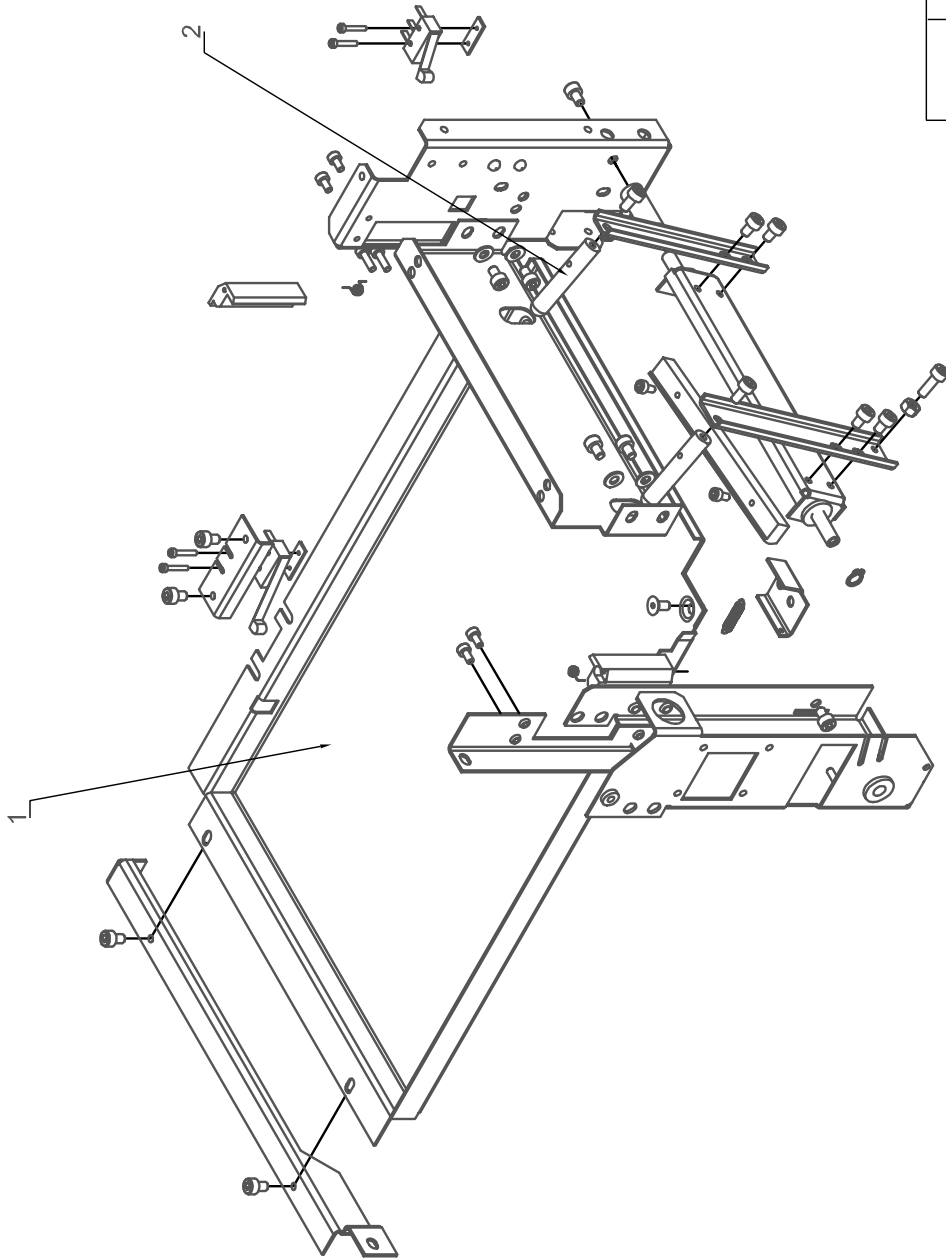
INDEX	PART NUMBER	DESIGNATION
1	XDA795AS	ENS POSITION K7
2	XDA794AS	SAMPLING, TUBE DETECTION

Ind	NOTE TECHNIQUE	MODIFICATIONS	LML051	DESIGNATION : SAMPLING, TUBE DETECTION			
				DATE : 29/04/2002	DIAG :	PAGE : 35	
				PENTRA 80			




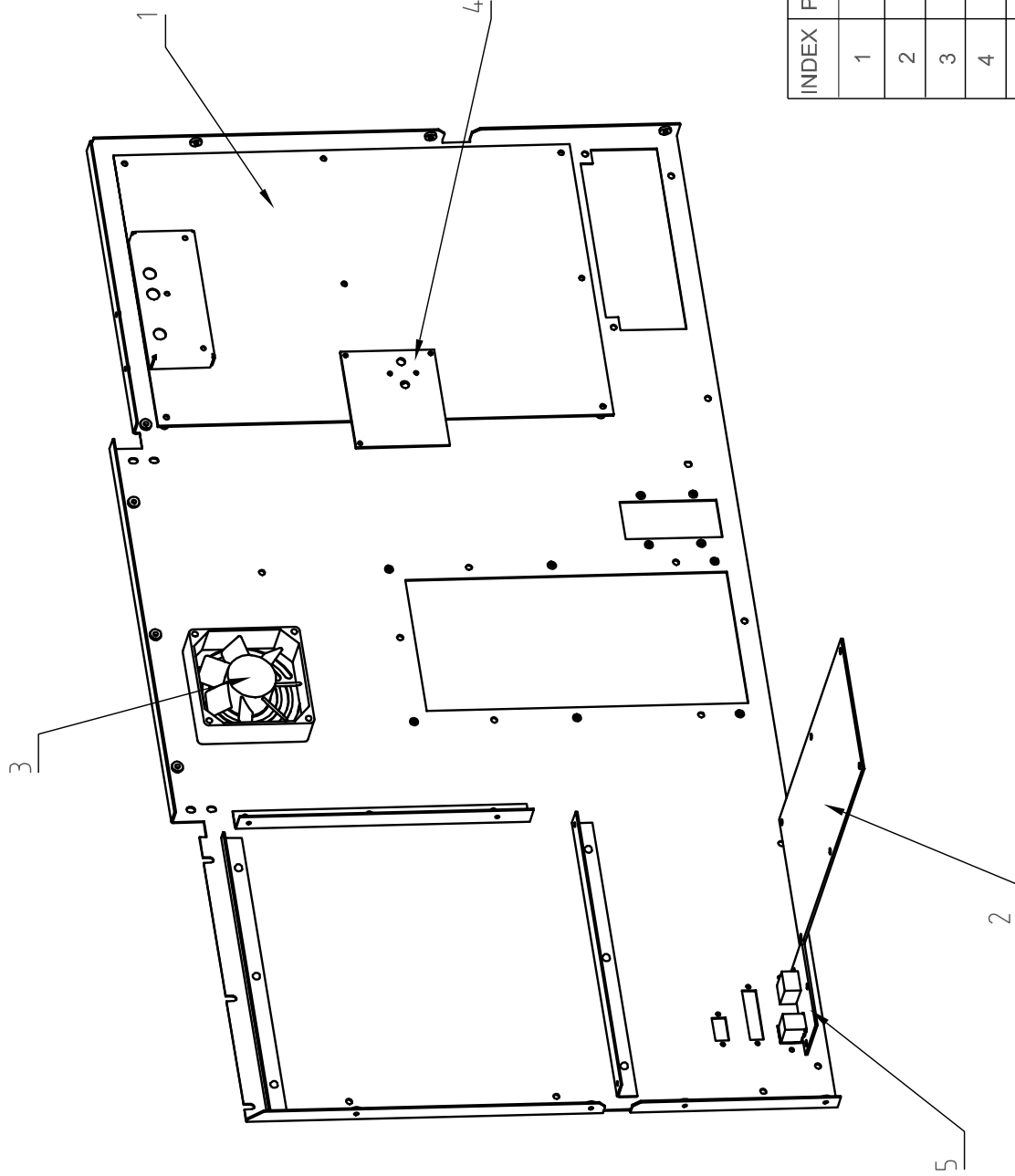
INDEX	PART NUMBER	DESIGNATION
1	FAJ007A	COVER, CLOSING MAGNET P80

DESIGNATION :				COVER, CLOSING MAGNET P80			
A		Creation		DATE : 28/01/02		DIAG :	
Ind		NOTE TECHNIQUE		LML032		PAGE : 36	
				MODIFICATIONS			
				PENTRA 80			




INDEX	PART NUMBER	DESIGNATION
1	GBL0068	CUP, RACK EJECTION TRAY P80
2	GBL0062	CARRIAGE, RACK EJEK PUSHROD

			DESIGNATION :			RACK EJECTION			
			DATE : 21/03/02		DIAG :	PAGE : 37			
						LML044		PENTRA 80	
						MODIFICATIONS			
A			Creation						
Ind		NOTE TECHNIQUE							



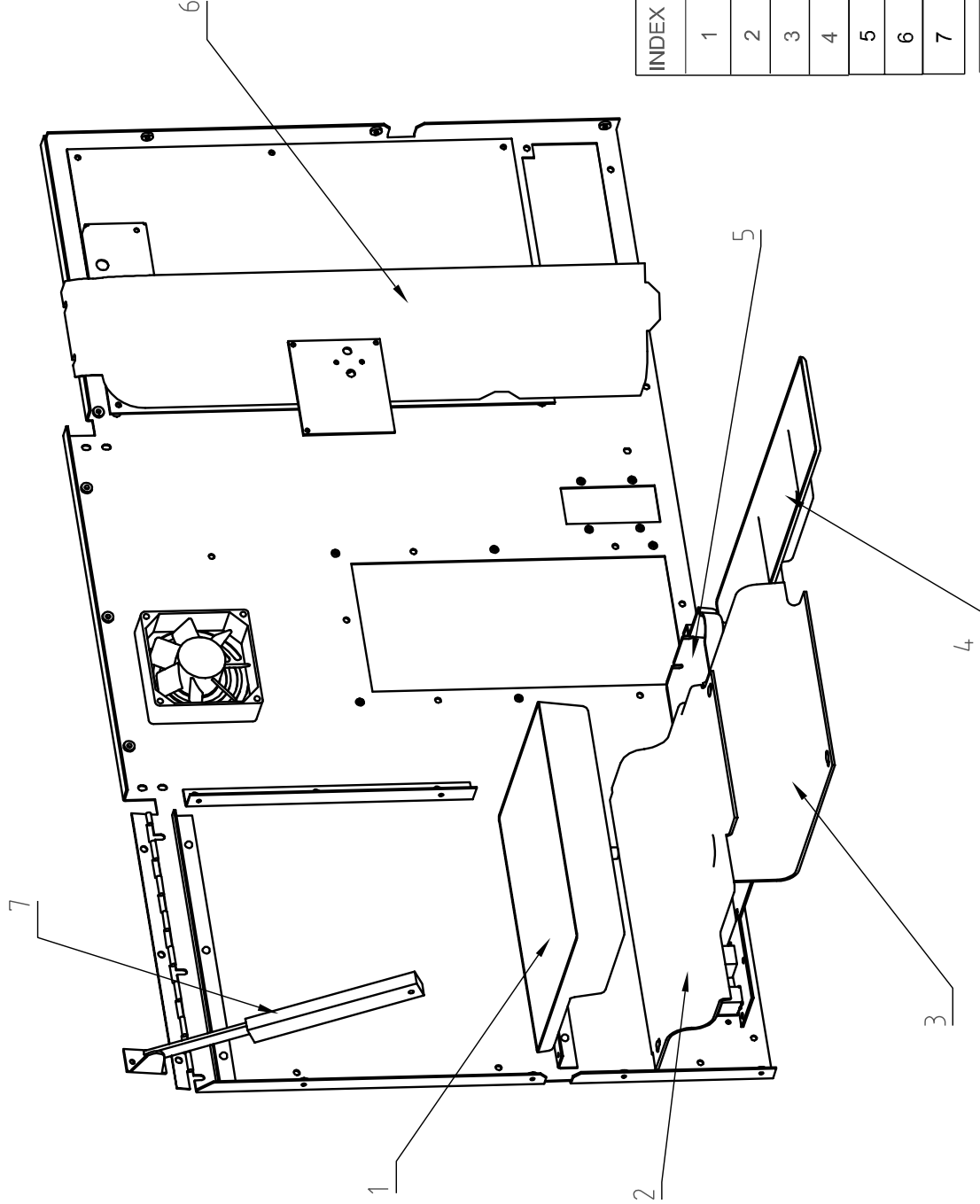
INDEX	PART NUMBER	DESIGNATION
1	XAA456BS	PCB, MAIN BOARD P80
2	XAA459AS	PCB, MOTOR BOARD P80
3	XBA393A	FAN, MAIN FAN 24V P60/P80
4	XAA458AS	PCB, PREAMPLI BOARD
5		USB + INTERNET

DESIGNATION :				PENTRA 80 BOARDS P80					
DATE :				15/04/02		DIAG :		PAGE : 38	
LML047				PENTRA 80					
MODIFICATIONS				Creation					
Ind		NOTE TECHNIQUE							
A									








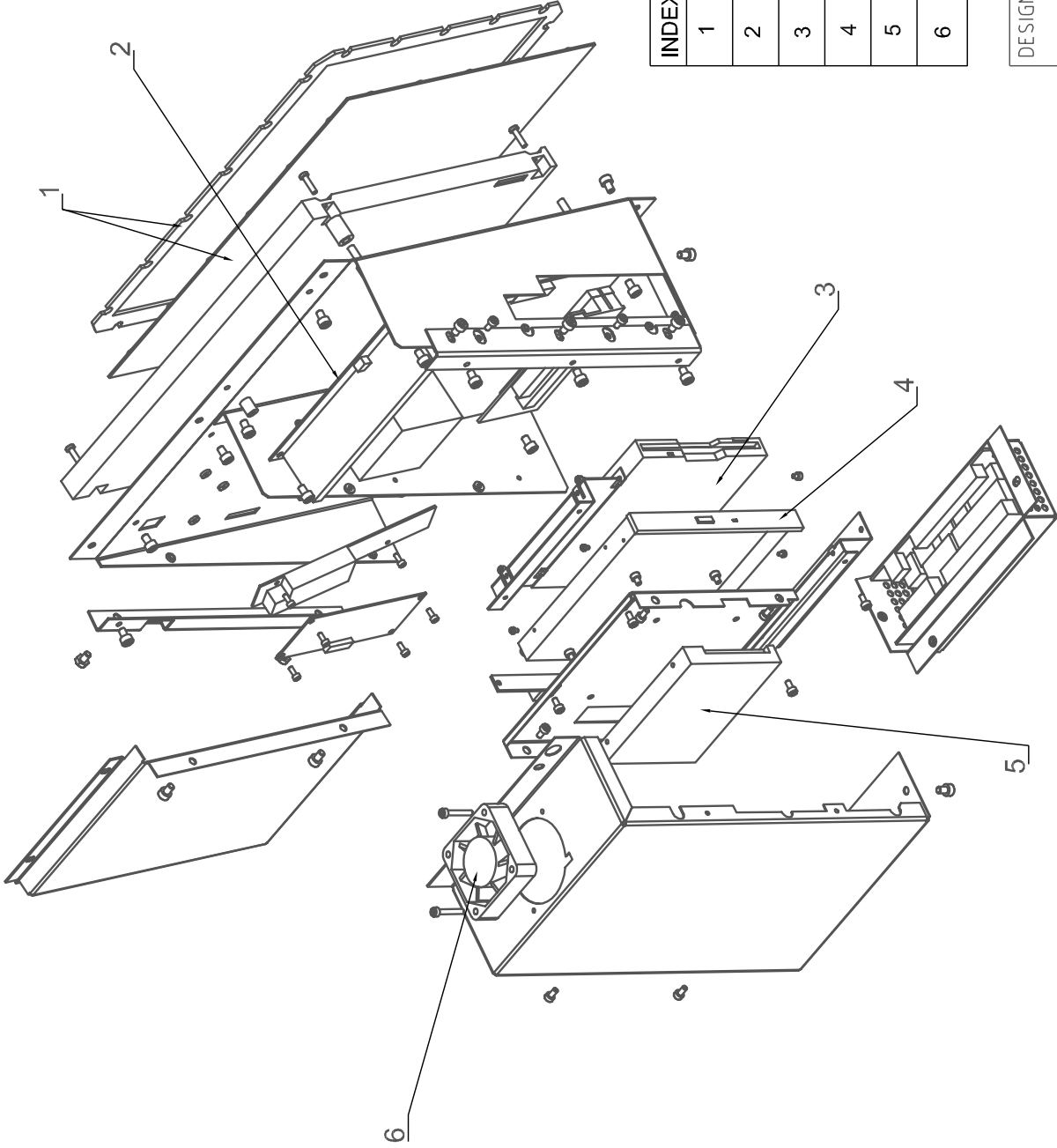


INDEX	PART NUMBER	DESIGNATION
1	GBL0164	CUP, OVERFLOW REAG BOTTLE P80
2	GBL0215	CUP, OVERFLOW TOP MOTOR PCB
3	GBL0216	CUP, OVERFLOW MOTOR BOARD
4	GBL0193	CUP, OVERFLOW LIQ SYRINGES P80
5	GBL0194	DRAIN SYRINGE RECUP. TRAY
6	GBL0213	CUP, OVERFLOW MAIN BOARD P80
7	FBM003A	COVER, REAGENT COVER HOLDER

		DESIGNATION :		RECUPERATIONS TRAY P80	
		DATE : 15/04/02		DIAG :	PAGE : 39
		LML048		PENTRA 80	
		MODIFICATIONS			
A		Creation			
Ind		NOTE TECHNIQUE			





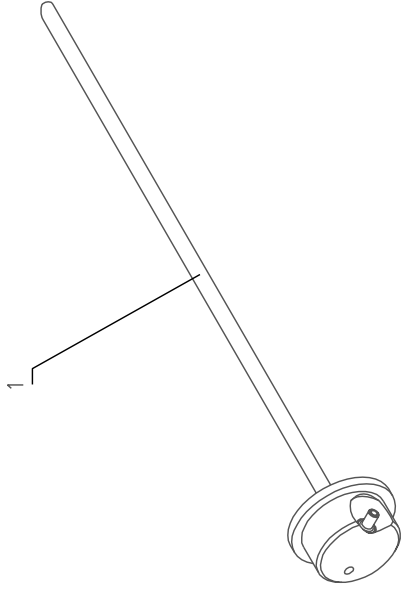


INDEX	PART NUMBER	DESIGNATION
1	XAA511AS	PCB, TACTILE SCREEN FUTJISU P80
2	XAA509AS	PCB, MAIN BOARD PC W/O RAM
3	CBT014A	PCB, FLOPPY DISK READER P80
4	CBT013A	PCB, CD-ROM READER
5	XAA510AS	PCB, IDE HARD DISK LOADED
6	XBA507AS	FAN, FOR COMPUTER P80

DESIGNATION :			MODULE PC	
DATE : 25/01/02		DIAG :	PAGE : 40	
LML026		PENTRA 80		



A	NOTE TECHNIQUE	Creation	MODIFICATIONS
Ind			



INDEX	PART NUMBER	DESIGNATION
1	GBG245A	REAGENT, STRAW D=28 P80

DESIGNATION :

REAGENT, STRAW D=28 P80

DATE : 19/03/02

DIAG :

PAGE : 41

LML043

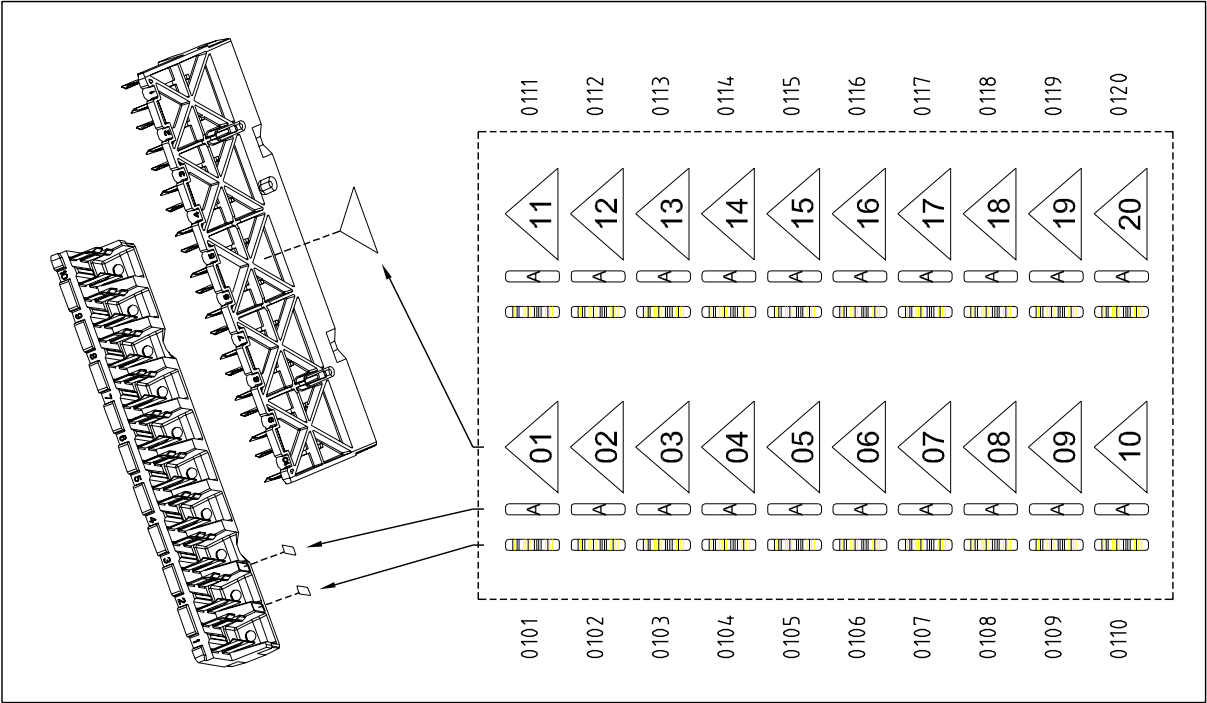
MODIFICATIONS

Creation


NOTE TECHNIQUE

A  
Ind





INDEX	PART NUMBER	DESIGNATION
1	HAX0053	STICKER, RACK LABEL "A" 1-20
2	HAX0054	STICKER, RACK LABEL "B" 1-20
3	HAX0055	STICKER, RACK LABEL "A" 21-40
4	HAX0056	STICKER, RACK LABEL "B" 21-40
5	HAX0057	STICKER, RACK LABEL "A" 41-99
6	HAX0058	STICKER, RACK LABEL "B" 41-99
7	HAX0029	RACK LABEL TYPE3 - 1 TO 20
8	HAX0030	RACK LABEL TYPE3 - 21 TO 40
9	HAX0031	RACK LABEL TYPE3 - 41 TO 99

				DESIGNATION : STICKER, RACK LABEL					
				DATE : 28/01/02		DIAG :		PAGE : 42	
				LML031		PENTRA 80			
				MODIFICATIONS					
A		Creation							
Ind		NOTE TECHNIQUE							



## Spare part list

1. Spare part list .....	9-2
--------------------------	-----

## 1. Spare part list

Table 1: Spare part list

Part Number	Designation
ABC006A	PCB,BACKLIGHT NEC COMPUTER P80
CAE006A	SWITCH,MICROSWITCH XC5-81-82
CAE010A	SWITCH,MICROSWITCH XC5-81
CAE011A	SWITCH,MICROSWITCH XCH5-S2
CAE019A	SWITCH,MICROSWITCH XCC5-81-S4
CAE020A	SWITCH,MICROSWITCH XGG2A
CAY013AS	PCB,LCD COLOR SCREEN P80
CBC008A	PCB,BARCODE INTERNAL P80
CBK043A	PCB,QWERTY KEYBOARD P80/P60C+
CBK044A	PCB,MOUSE P80/P60C+
CBK045A	PCB,AZERTY KEYBOARD P80/P60C+
CBR019A	PCB,TACTILE BOARD FUTJI PC P80
CBT013A	PCB,CD-ROM READER P80
CBT014A	PCB,FLOPPY DISK READER P80
CCC009A	PCB,SDRAM 128MB 100MHZ P80
DAC024A	CABLE,PRINTER MIC/P60/P80
DAC028A	CABLE,PC/MAIN BOARD P80
DAD075A	CABLE,LIQUID VALVE L=350 10F14
DAD107A	CABLE,LIQUID VALVE L=480 10F14
DAD109A	CABLE,LIQUID VALVE L=560 10F14
DAD112A	CABLE,CARRIAGE BOARD P60C+/P80
DAD119A	CABLE,RACK TRANSF SOLENOID P80
DAD120A	CABLE,PREAMP BOARD LMNE P80
DAD121A	CABLE,MOTOR PCB/MAIN PCB P80
DAD122A	CABLE,LIQUID VALVE L=650 10F14
DAD123A	CABLE,PC/PRINT L=1000 5-25 P80
DAD124A	CABLE,PC/RS L=1000 5-09 P80
DAJ007A	OPTICAL,LAMP FOR BENCH P60/P80
DAK026A	FAN,FAN FOR SOCKET 370 PC P80
DAM009A	VALVE,SOLENOID PIERC. BLOCK
DBN006A	PCB,POWER SUPPLY BLOCK P80
EAC008A	FITTING,ANTI ROTATION WASHER
EAC010A	FITTING,LUER FEMALE I=3MM
EAE005AS	TUBING,TYGON 1,016(0,040) L=2M
EAE006AS	TUBING,TYGON 1,295(0,051) L=2M
EAE007AS	TUBING,TYGON 1,52(0,060) L=2M
EAE008AS	TUBING,TYGON 2,06(0,081) L=2M
EAE009AS	TUBING,TYGON 2,29(0,090) L=2M
EAE028AS	TUBING,CRYSTAL 4X6 L=2M
EAE033AS	TUBING,TYGON 1,143(0,045) L=2M
EAE034AS	TUBING,TYGON 2.54(0,100) L=2M
EBB059AS	FILTER,RUBBER CAP DEBRIS 25mm
FAA013A	O'RING,NEEDLE RINSE BLOC C+/80
FAA040A	O'RING,5DIFF SYRINGE D=12,1

Table 1: Spare part list

Part Number	Designation
FAA054A	O'RING,SAMPL. NEEDLE C+/P80
FAA057A	O'RING,PIERC NEEDLE P120/C+/80
FAA064A	O'RING,SAMPL. SYRINGE P60/P80
FAA065A	O'RING,REAGENT SYRINGE D=6,3
FAA066A	O'RING,DRAINING CHAMBER P60/80
FAA067A	O'RING,5DIFF SYRINGE D=2,4
FAJ008A	COVER,CLOSING MAGNET P80
FAK001A	CHAMBER,APERTURE 50µ
FAK003A	CHAMBER,APERTURE 80µ
FAL009A	SILENT BLOC,FOR SUB ASSEMBLIES
FAL010A	SILENT BLOC,OPTIC BENCH P60/80
FBH018A	COVER,DUST COVER P80
FBL001A	REAGENT,REAGENT CAP 2 HOLES
FBM003A	COVER,REAGENT COVER HOLDER P80
FBR011A	BELT,NEEDLE L=364 P60/P80
FBR020A	BELT,CARRIAGE L=660 P80
GAL094A	CHAMBER,WAST.P120/DIL TANK P60
GBC015A	CLIP,MIX CH. HOLDER MIC/P120
GBC030A	SYRINGE,REAG PISTON P60/SPS/80
GBC031A	SYRINGE,LYSE PISTON MIC/P60/80
GBG033A	SYRINGE,REAG BLOC BODY P60/P80
GBG037A	SYRINGE,5DIFF BLOC BODY P60/80
GBG040A	SYRINGE,5DIFF PISTON P60/P80
GBG042A	SYRINGE,CROSSPIECE P60/SPS/P80
GBG044A	SYRINGE,SAMPL SYR.BODY P60/80
GBG048A	SYRINGE,SAMPLING CROSSPIECE
XEA747AS	SYRINGE,VAC/WASTE PISTON P60
GBG145A	REAGENT,STRAW D=20 P60/P80
GBG275A	O'RING,APERTURE P60/M60/P80
GBG157A	CHAMBER,COUNTING HEAD P60/P80
GBG166A	NEEDLE,PIERC. RINSE BLOC C+/80
GBG278A	NEEDLE,RINSING BLOCK P60C+/P80
GBG169A	NEEDLE,PIERCING P60C+/P80
GBG288A	NEEDLE,GUIDE P60C+/P80
GBG176AS	CARRIAGE,NEEDLE STOP P60C+/P80
GBG211A	SYRINGE,VACCUM PUMPBODY P60/80
GBG212A	SYRINGE,WASTE PUMP BODY P60/80
GBG245A	REAGENT,STRAW D=28 P60/P80/ACT
GBL0042	COVER,RACK LOADING TRAY P80
GBL0062	CARRIAGE,RACK EJEC.PUSHROD P80
GBL0068	COVER,RACK EJECTION TRAY P80
GBL0089	CUP,OVERFLOW T° ROOM P80
GBL0149	CUP,FOR GRABBER P80
GBL0164	CUP,OVERFLOW REAG. BOTTLE P80
GBL0183S	SAMPLING,STD TUBE HOLDER P80
GBL0193	CUP,OVERFLOW LIQ. SYRINGES P80
GBL0213	CUP,OVERFLOW MAIN BOARD P80

Table 1: Spare part list

Part Number	Designation
GBL0215	CUP,OVERFLOW TOP MOTOR PCB P80
GBL0216	CUP,OVERFLOW MOTOR BOARD P80
GBL0254S	SAMPLING,OPT. TUBE HOLDER P80
GBL0280	RACK,10 TUBES 13x82 P80
HAE026B	STICKER,VALVES JOUCO (1-10)
HAE027B	STICKER,VALVES JOUCO (11-20)
HAE028B	STICKER,VALVES JOUCO (21-30)
HAE029B	STICKER,VALVES JOUCO (31-40)
HAX0032	«STICKER,COVER LABEL»»PENTRA 80»»»
HAX0033	«STICKER,COVER LABEL «»ABX»»»
HAX0034	STICKER,PC CONNECTIONS P80
HAX0053	«STICKER,RACK LABEL «»A»» 01-20 «
HAX0054	«STICKER,RACK LABEL «»B»» 01-20 «
HAX0055	«STICKER,RACK LABEL «»A»» 21-40 «
HAX0056	«STICKER,RACK LABEL «»B»» 21-40 «
HAX0057	«STICKER,RACK LABEL «»A»» 41-99 «
HAX0058	«STICKER,RACK LABEL «»B»» 41-99 «
LAD002BS	TOOL,LATEX RBC/PLA
MAB090A	TOOL,TORX KEY T10
RAA022A	MANUAL,TECHNICAL P80
RAB108E	MANUAL,USER'S P80 GB
RAC057C	MANUAL,USER'S P80 FR
XAA429AS	PCB,LED BOARD FOR COVER P60/80
XAA456BS	PCB,MAIN BOARD P80
XAA458AS	PCB,PREAMP.LMNE P80
XAA459BS	PCB,MOTOR BOARD P80
XAA478AS	PCB,SOLENOID RACK TRANSFER P80
XAA547A	PRINTER,OKI B4200, 220V
XAA548A	PRINTER,OKI B4200, 110V
XAA509CS	PCB,MAIN BOARD PC W/O RAM P80
XAA510CS	PCB,IDE HARD DISK LOADED P80
XAA511AS	PCB,TACTILE PANEL FUTJISU P80
XBA322B	SENSOR,WASTE DETECTION P120/80
XBA342A	SENSOR,CARRIAGE MOVE P80
XBA389A	PHOTOMETER,HB CPTC P60/P80
XBA393A	FAN,MAIN FAN 24V P60/P80
XBA396A	SENSOR,SAMP NEEDLE MOVE P60/80
XBA399B	FITTING,GROUND FLOWCELL P60/80
XBA411A	MOTOR,PIERCING MECHA P60C+/P80
XBA425A	CABLE,T° ROOM HARNESS P80
XBA398B	CABLE,COAX RBC/WBC
XBA431A	SENSOR,CHAMBERS DRAINING P80
XBA432A	SENSOR,HOME RACK TRF/MOVE GRAB
XBA453A	PCB,BARCODE EXTERNAL P60C+/P80
XBA474A	MOTOR, RACK TRANSFER P80
XBA475A	MOTOR,RACK LOADING P80
XBA476A	MOTOR,RACK LOADING AXIS P80



Table 1: Spare part list

Part Number	Designation
XBA478A	MOTOR,CARRIAGE P80
XBA479A	MOTOR,BLOCK FOR SAMPL. SYR. P80
XBA490A	CABLE,LMNE FLOWCEL CATHOD WIRE
XBA492A	FITTING,GROUND FOR REAGENT P80
XBA507AS	FAN,FOR COMPUTER P80
XCA166A	CHAMBER,ISOLATOR (LONG)
XCA167A	CHAMBER,ISOLATOR (SMALL)
XCA191A	CHAMBER,ISOLATOR VENT. P80/C+
XDA481B	VALVE,LIQ. 2WAYS/NC W/O COIL
XDA483B	VALVE,LIQ. 3WAYS W/O COIL
XDA555AS	TOOL,FLOWCELL ADJ. KNOB
XDA591AS	SYRINGE,5DIFF ASSY P60/P80
XDA592AS	SYRINGE,REAGENT ASSY P60/P80
XDA593AS	SYRINGE,SAMPLING ASSY P60/P80
XDA601BS	CHAMBER,LMNE FLOWCELL P60/P80
XDA602C	CHAMBER,4 CHAMBERS BLOC P60/P80
XDA605A	CHAMBER,DIL. TANK ASSY P60/P80
XDA610C	CHAMBER,WBC/BASO CPTC P60/P80
XDA616AS	NEEDLE,190µL SYR. P60/SPS/P80
XDA617AS	NEEDLE,100µL SAMPL SYR. P60/P80
XDA621A	O'RING,VAC/WASTE PUMP + WASHER
XDA622A	O'RING,REAGENT SYR. + WASHER
XDA623AS	REAGENT,BLOCK EQUIPED P60/P80
XDA625BS	HEATER,BLOCK COMPLETE P60/P80
XDA626AS	CHAMBER,DIL. TANK COVER P60/P80
XDA655AS	NEEDLE,SAMPL. NEEDLE P60C+/P80
XDA657C	CHAMBER,5 CHAMBERS BLOC P60/80
XDA725A	SAMPLING,MECHANISM ASSY P80/C+
XDA728A	SAMPLING,PIERCING BLOCK P80
XDA729A	OPTICAL,BENCH COMPLETE PENTRA 80
XDA895AS	COVER, RIGHT DOOR EQUIPED P80
XDA741AS	SWITCH,LEFT LOADING EQUIP P80
XDA742AS	SWITCH,RIGHT LOADING EQUIP P80
XDA743A	MOTOR,MIXING COMPLETE P80
XDA826AS	MOTOR,BLOCK FOR 5DIFF SYR. P80
XDA746AS	MOTOR,BLOCK FOR REAG. SYR. P80
XDA824AS	MOTOR,BLOC FOR SAMPL. SYR. P80
XDA827AS	SYRINGE,WASTE COMPLETE P80
XDA828AS	SYRINGE,VACUUM COMPLETE P80
XDA751C	VALVE,LIQ 12 VALVE ASSY (1-12)
XDA752C	VALVE,LIQ 7 VALVE ASSY (13-19)
XDA753C	VALVE,LIQ 4 VALVE ASSY (20-23)
XDA754C	VALVE,LIQ 7 VALVE ASSY (24-30)
XDA755C	VALVE,LIQ 5 VALVE ASSY (31-35)
XDA832AS	SYRINGE,5DIFF+ MOTOR ASSY P80
XDA774A	SYRINGE,REAGENT+MOTOR ASSY P80
XDA834AS	SYRINGE,SAMPL.+ MOTOR ASSY P80

Table 1: Spare part list

Part Number	Designation
XDA790AS	SAMPLING,RACK TRACTOR ASSY P80
XDA791AS	SAMPLING,RIGHT RACK LOADER P80
XDA792AS	SAMPLING,LEFT RACK LOADER P80
XDA793AS	BELT,RACK LOADING P80
XDA794AS	SAMPLING,TUBE DETECTION P80
XDA795AS	SAMPLING,RACK TRACER ASSY P80
XDA796AS	SAMPLING,RACK LOADING LOCK P80
XDA797AS	SAMPLING,GRABBER BLOC ASSY P80
XDA798AS	CARRIAGE,SAMPLING ASSY P80
XDA803AS	COVER,FRONT LEFT COVER P80
XDA804AS	COVER,FRONT RIGHT COVER P80
XEA018A	REAGENT,STRAW DILUENT L=360
XEA286AS	KIT,O'RING+WASHER P60/P120/P80
XEA311AS	KIT,FITTINGS
XEA410AS	KIT,TYGON TUBINGS
XEA486BS	KIT,MAINTENANCE 1 YEAR P60/P80
XEA488AS	KIT,HEATER HARNESS P60/P80
XEA616AS	KIT,FLOWCELL INJECTOR TUBE P60
XEA663A	CABLE,COAX LMNE FLOWCEL P60/80
XEA755A	KIT,INSTALLATION P80
XEA710BS	KIT,MAINTENANCE 6 MONTHS P80
XEA711BS	KIT,PISTONS P80
XEA720AS	KIT,SPRINGS P80
XEA813A	KIT,T° ROOM FAN+HARNESS P80
XEA722AS	KIT,GROUND FITTINGS P80
XEA723AS	KIT,EXTENSION CABLE PC P80
XEA736AS	KIT,MASTER V1.03 P80